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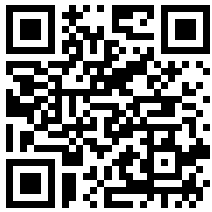

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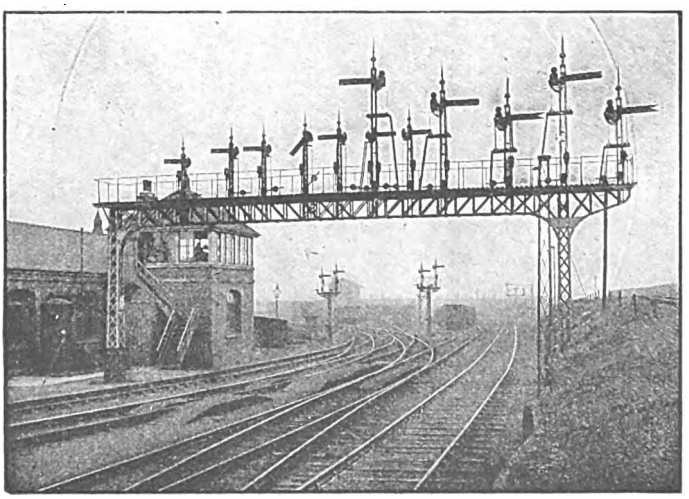

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Weight of Engine and Tender in working order, 125 tons 16 cwts.

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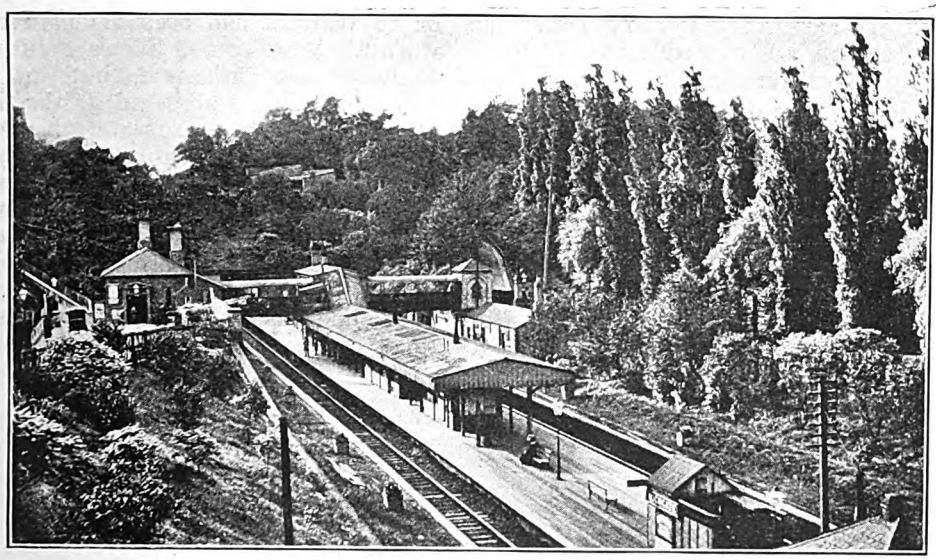

GENERAL VIEW OF HIGHGATE STATION.

The Edgware, Highgate and London Railway.

By H. L. HOPWOOD.

UNDER this name probably very few readers will recognise the Alexandra Palace, Edgware and High Barnet branches of the Great Northern Railway; yet such was the title of the original company which obtained the necessary Acts of Parliament for construction. These lines serve that part of North London which is often referred to as the "Northern Heights," a district now mostly suburban in character, with very little open country until Finchley is passed. Situated on the Great North Road, such places as Highgate, Finchley and Barnet have always been of some importance and they figured in history centuries ago.

The name, "Northern Heights," which is applied to the district, is not (as somebody once gravely informed the writer) a "catch-phrase" invented by the Great Northern Railway authorities to advertise the neighbourhood served by their suburban stations, for the title existed long before the railway did. Neither is it a misnomer, for there is a pronounced line of hills running east and west from Stamford Hill to Harrow, taking in Crouch Hill, Muswell Hill, Highgate, Hampstead and Dudding Hill. The highest part of Highgate is 426 ft. above sea level. Another, and higher range of hills, parallel to the last, but further north, is that extending from Barnet, by Totteridge, Mill Hill, Elstree and Stanmore, to Rickmansworth.

A railway through this district was proposed in 1862, in which year the Edgware, Highgate and London Railway was authorised. The suggested line of this company commenced at Seven Sisters Road Station on the Great Northern main line, 2½ miles from King's Cross, and took a north westerly direction through Highgate and Finchley to Edgware. Although promoted independently, the railway was to be worked by the Great Northern, who subscribed one-third of the capital. In 1864 and 1866 further Acts were obtained by the Edgware Company for branches from Finchley to High Barnet and from Highgate to Muswell Hill,

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Another independent company, called the Muswell Hill, was created in 1866 with the object of continuing the latter branch into the Alexandra Palace, erection of which had started in 1863. The Muswell Hill Company also proposed to make a connection with the Alexandra Park branch of the Great Eastern Railway (authorised in 1866, and again in 1874), so as to put that railway into communication with the Palace.

The total length of the Muswell Hill Railway as projected, was 1¾ miles, but as actually constructed (from near Muswell Hill to Alexandra Palace) it was a system measuring only 38 chains, for the proposed branch to the Great Eastern Railway was never made.

At this time, the Great Northern authorities, being unsuccessful in promoting a Bill for a line from Finchley to Potters Bar, as an alternative, proposed to purchase the Edgware, Highgate and London Railway. This arrangement was agreed to, and in July 1867, shortly before the line was opened, the transfer became an accomplished fact.

A proposal to carry the Edgware line on to Watford had been made in 1864, when the Watford and Edgware Junction Railway was authorised, but in 1867 this company was absorbed by the Great Northern, who, three years later, abandoned the idea of an extension. In 1897 a new company—the Watford, Edgware and London—put forward a very similar scheme, but nothing has been done towards construction, although the company still exists.

The line was opened from Seven Sisters Road to Edgware (8¾ miles) on August 22, 1867, with intermediate stations at Crouch End; Highgate; East End Finchley; Finchley and Hendon and Mill Hill. Some years later, Seven Sisters Road, East End Finchley and Finchley and Hendon stations were renamed Finsbury Park, East Finchley and Finchley Church End respectively. Beyond Highgate there was originally a single line only. The time-tables of September, 1867, showed 18 passenger trains from King's Cross, 10 of which ran to Edgware; the remainder terminating at Highgate. There was a similar service in the reverse direction. By December 1867 the line had been

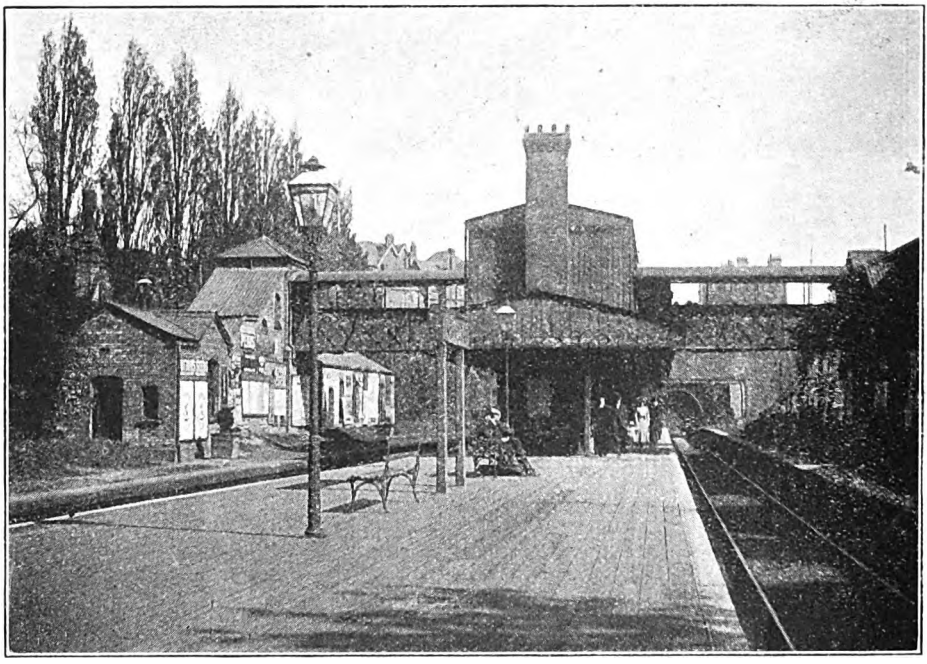

Photo.] HIGHGATE STATION, SHOWING DISUSED PLATFORMS. [*H. L. Hopwood.*

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doubled as far as East End Finchley and to that station were extended trains which had previously gone no further then Highgate.

A service between Great Northern and London, Chatham and Dover stations was inaugurated in March 1868, when both Companies' trains commenced working between Victoria and Wood Green, Southgate and Barnet. At the same time, some of the Edgware trains ran to and from Ludgate Hill, but in the following June these were extended further south—to Loughborough Road (now Junction). A year later, *i.e.*, on June 1 1869, Great Northern trains first used Moorgate Street as a City terminus, and the Edgware trains were then diverted from Loughborough Road to that station.

By January 1870 the line was doubled to Finchley, but from that point, in the direction of Edgware, it has remained single to the present time. In 1869 there was one fast train—the 8.44 a.m. ex Moorgate Street which, after leaving Finsbury Park, made its first stop at Finchley. Later on, the train ran from King's Cross to Finchley without stop, covering the 7¼ miles in 15 minutes. Fifty years ago this was not at all a bad performance for a local train which had to face the steep ascent to Highgate. For some years past 20 minutes has been the best time between King's Cross and Finchley.

The double line extension from Finchley to High Barnet (3¾ miles), with intermediate stations at Torrington Park (now Woodside Park) and Totteridge, was opened April 1, 1872, and this event brought about a reorganisation of the train service, as all through trains (except one) made High Barnet their objective, instead of Edgware. There were then 23 each way between London and High Barnet. Edgware had 16 locals from Finchley and one through train—the 7.6 p.m. from Moorgate Street. In the up direction there were 17 locals to Finchley in connection with trains from High Barnet. Incidentally, the King's Cross-Finchley fast run of the 8.44 a.m. ex Moorgate Street disappeared when that train was diverted from Edgware to High Barnet. At a later date Edgware was given some through trains on Sundays.

Alexandra Palace, which had been under construction for about 10 years, was opened to the public on May 24 1873, and on the same day the branch line from Highgate (Park Junction) was brought into use. The Great Northern line extended to just beyond Muswell Hill (1 mile 14 chains), the Palace extension (38 chains) being private property, as mentioned previously. Between King's Cross and Alexandra Palace there were 18 trains, six of which did not stop between Holloway and Highgate. It may be pointed out that in 1873 Holloway station served a much larger population than did Finsbury Park, and it was not until two years later —when the opening of the Canonbury Junction line enabled North London trains to reach the Great Northern system —that Finsbury Park began to assume its present importance as a junction. In addition to the through trains mentioned, there were also five early morning trains, which ran only from Highgate to Muswell Hill and back.

The Palace had been open little more than a fortnight, when, on June 9, 1873, it was totally destroyed by fire. This disaster was the means of depriving the railway of a considerable revenue, for during the brief career of the Palace, nearly 100,000 passengers had been booked by the Great Northern route. For a short time the service was reduced to seven trains each way, for the benefit of local residents, but after July, 1873, the branch was closed—except for a daily goods train to Muswell Hill—pending the rebuilding of the Palace.

North London trains commenced running between Broad Street and New Barnet and High Barnet on January 18, 1875, and when Alexandra Palace was reopened on May 1 of the same year, ten North London trains worked to and from that station. At this period there were also two Great Northern trains between the Palace and Victoria. Commencing in June, 1878, six Great Northern trains ran each way between Finsbury Park and Woolwich Arsenal, South Eastern Railway. In July the number was increased to eight, and seven of them were extended beyond Finsbury Park —one to Enfield, two to High Barnet, and four to the Palace. They continued until August, 1880, when they were displaced by South Eastern trains. The

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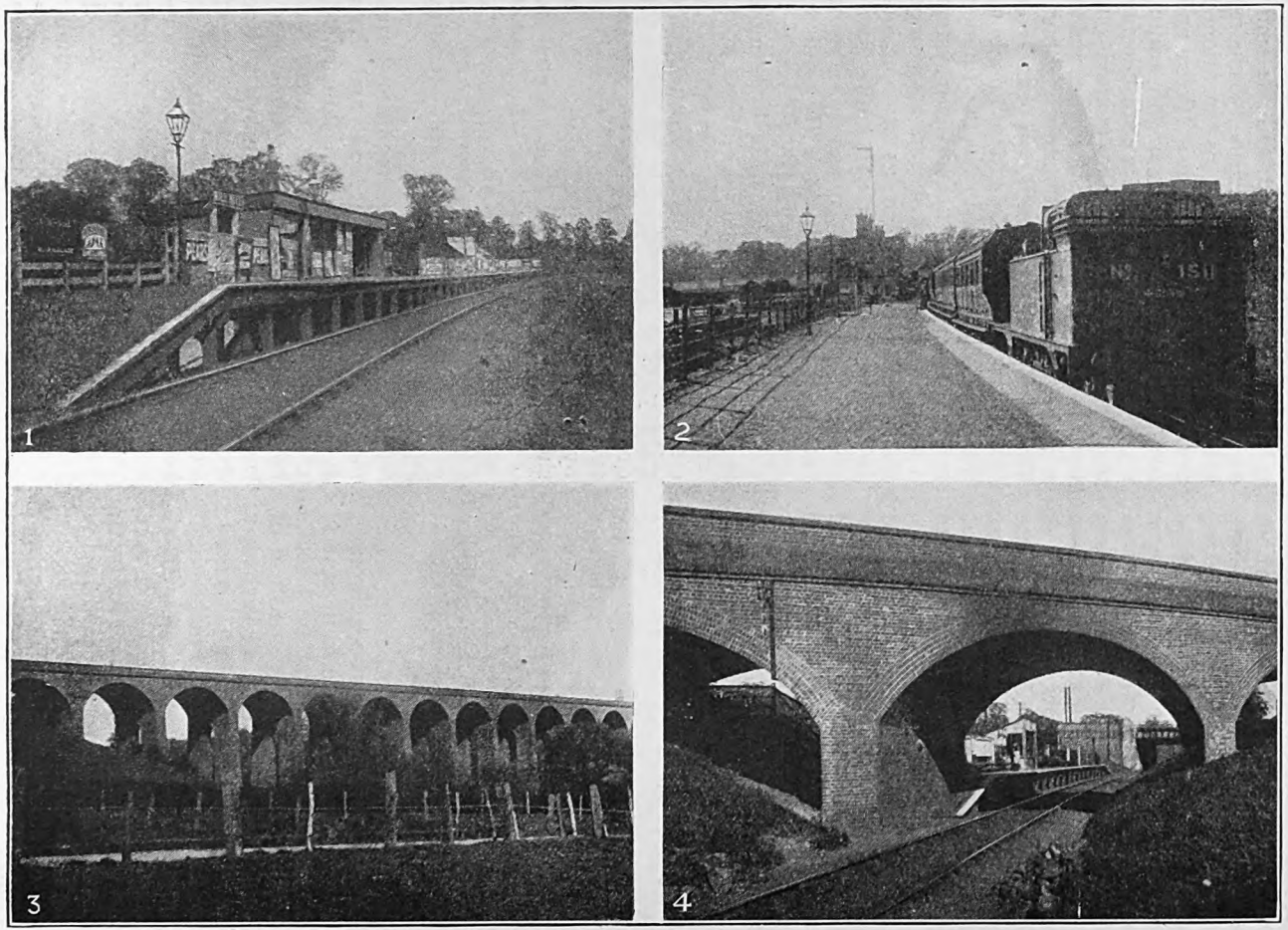

Photos by] VIEWS ON THE EDGWARE BRANCH. [*H. L. Hopwood.*

1. Mill Hill Station.
2. Train at Edgware.
3. Dollis Brook Viaduct.
4. The Hale "Halt."

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latter numbered eight or ten (according to season), five of which ran to Alexandra Palace and the others to Enfield. Later on the majority terminated at Finsbury Park, but one went to Finchley and another to Muswell Hill. Subsequently, the Finchley train was diverted to Enfield, and in more recent times Alexandra Palace and Enfield were the northern termini of South Eastern trains. The through service to and from South Eastern stations was withdrawn after April 30, 1907, and that to and from London, Chatham and Dover stations after September 30 in the same year, and since the last-mentioned date the North London is the only foreign railway working trains to and from Great Northern suburban stations.

An additional station at Stroud Green, between Finsbury Park and Crouch End, was opened April 11, 1881. Consequent upon the closing of Alexandra Palace, branch trains ceased to run beyond Muswell Hill after August, 1882, except on occasions during the few following years, when some special function was held at the Palace. The latter was closed permanently from about 1890 until 1902, when it was again opened to the public without charge for admission. In the meantime, however, Alexandra Palace station had been available for local residents since April, 1898, at which date most Muswell Hill trains were extended thereto.

In its climb over the "Northern Heights" a train has to negotiate some very heavy gradients. From Finsbury Park to Park Junction, 2½ miles, there is an ascent at 1 in 77, 64, 72, 50, 60, &c. Park Junction is the summit, and onwards to Edgware there is practically a continuous fall, first at 1 in 110 to East Finchley; then at 1 in 115, 122, 95, 79, and 95, through Finchley to Mill Hill. From Mill Hill to Edgware grades are less pronounced, and vary between 1 in 240 and 1 in 152. From Finchley to High Barnet there is first a fall at 1 in 100 to Woodside Park, then a level mile to Totteridge, and finally a steep ascent at 1 in 90, 61, and 300 into High Barnet. Except for a short rise at 1 in 100 after Cranley Gardens, the Alexandra Palace branch has a general falling tendency from Park Junction.

On leaving Finsbury Park the line is carried first on a high embankment, and then through a deep cutting past Crouch End and on to Highgate. Approaching this station, the down and up lines pass through separate tunnels. Situated in a tree-clad cutting, Highgate is the most picturesque station in North London. In the illustration on page 432 will be noticed the disused platforms on either side of the line. On the site occupied by the present island platform, there was formerly a shunting siding, capable of holding a short train. The alteration was carried out about 40 years ago. Leaving the station by the west tunnel (or tunnels, for there is one for each line), we come to Park Junction, where the Alexandra Palace line bears away to the right through Highgate Woods. The first station on this branch is Cranley Gardens, a comparatively new erection, dating from August 2, 1902. Just before Muswell Hill station is entered the train crosses a low viaduct of 17 arches.

Half a mile further is Alexandra Palace terminus. It will be remembered that this section originally belonged to the Muswell Hill and Palace Railway,* but this company ceased its separate existence in September, 1911, when it was absorbed by the Great Northern. Under private ownership, Alexandra Palace station had fallen into a dilapidated state, and when the Great Northern Railway acquired the property, some much-needed repairs and alterations were put in hand. Originally there were two very long platforms, each capable of holding at least three suburban trains. One platform was an island, and the other had a bay at one end. There were three roads, one of which had a platform face on each side of it. Accommodation was ample, even for the amount of excursion traffic dealt with in the 'seventies. The station was partially roofed over, but where the wooden platforms were exposed to the weather they had suffered considerably.

Alterations carried out by the Great Northern Railway were the shortening of the island platform, the demolition of the other, and an extension of the bay line to form a carriage siding. The old roof was dismantled and replaced by a platform awning. Accommodation was thus reduced, but it is quite equal to present-day

* This was the title, adopted in 1887, of the old Muswell Hill Company.

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requirements, as four trains can be berthed at one time at the island platform.

The most notorious thing about the old Muswell Hill and Palace Railway was its high charges; the third class fare from Muswell Hill to the Palace (41 chains) being twopence. The (Great Northern) tickets issued were distinctive in that they were coloured green instead of the customary blue for third class.

During the 50 and more years that it has been open, the Finchley and Edgware section has altered very little, and the branch may still be classed as "country" and not "suburban," the immediate surroundings being distinctly rural, if somewhat uninteresting. In contrast to the hilly district traversed between Finsbury Park and Finchley the journey on to Edgware is through flatter country, although north of the line we find the "Northern Heights" cropping up again in the form of the higher ridge at Mill Hill and Highwood Hill.

Soon after leaving Finchley the line is carried by means of a lofty viaduct across the valley through which flows the Dollis Brook. This insignificant stream empties itself into the Brent Reservoir at Hendon, a mile or two away. The imposing Dollis Brook Viaduct, with its 13 arches each having a 30 ft. span, is the most important work on the "Edgware, Highgate, and London" section of the Great Northern Railway. It carries a single line, but is built sufficiently wide to take two tracks. Stations on the Edgware branch have each but a single platform, and there are no intermediate crossing places, this four-mile section being worked on the staff system by "one engine in steam." Mill Hill is the first station, but the village of that name is some two miles away, and one has to climb the steep Bittacy Hill in order to reach it. The village is also served by Mill Hill station on the Midland main line, but this, too, is a considerable distance from it.

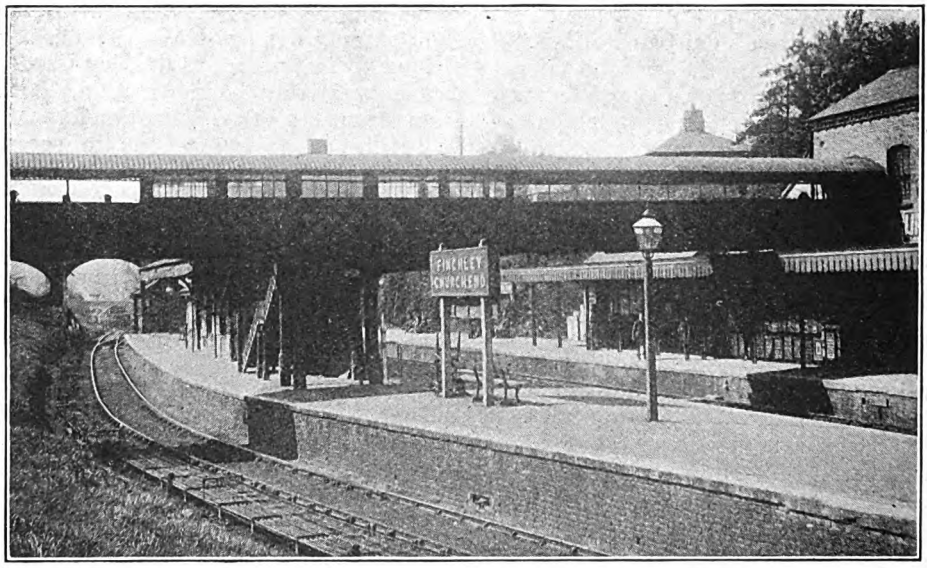

Photo.] FINCHLEY JUNCTION. [*H. L. Hopwood.*
Edgware Line in foreground.

A colony of new houses having grown up round the Midland station, the Great Northern Railway opened, on June 11, 1906, "The Hale" halt, opposite to it. An accompanying photograph, taken in 1909, represents the place as it was then, but later on the platform was lengthened, booking, &c., offices were added to the left of the waiting shed, and "The Hale, for Mill Hill," as it was then termed, was classed as a station with a stationmaster in charge. Near at hand is a small siding for goods traffic. At the same time Mill Hill (Great Northern) station was designated

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"Mill Hill, for Mill Hill Barracks." "And North Middlesex Gasworks" might well have been added, for the said gasworks, a public house and a few dingy-looking cottages are about the only things visible from the station platform.

At Edgware station there was formerly a small engine shed, but it was demolished, —during the great blizzard of January 18, 1881, we believe—and never rebuilt. The original signals on the branch are still standing, but have not been used for many years. They are of a pattern older than the standard Great Northern "somersault" type, and that on Edgware platform is shown in the photograph of Edgware station. The semaphores are worked by short levers attached near the foot of the post. This signal is lighted at night, but only to serve as a landmark.

From what has been said in connection with train services, it will be noticed that the trains of three foreign railways, *i.e.*, London, Chatham and Dover, South Eastern, and North London, at one time or another assisted to a very considerable degree in conducting the Great Northern's suburban passenger business, but it is a rather remarkable fact that these "foreign" trains have never penetrated to Edgware, the branch since its opening having been strictly a Great Northern preserve. This is, of course, due to the fact that the shuttle train is fully employed, and no useful purpose would be served if a foreign train occasionally shared the running.

The standard branch train is a "block set" of five four-wheeled coaches, but occasionally some six-wheelers are run instead. On February 19, 1906, the train was displaced by a rail motor which commenced to run between Finchley and Edgware (except on Saturdays and Sundays when the ordinary train was provided) but after an extensive trial lasting for more than a year the motor was withdrawn.

At Finchley there is an island platform on the down side, and Edgware branch trains run to and from the outer side of this, but through (Edgware) trains are dealt with on the main line. At present the London–Edgware through service consists of one down and two up trains. On Sundays there is a through train from Finsbury Park at 1.40 p.m. Trains for Edgware and High Barnet can leave Finchley at the same moment, as one does not foul the path of the other.

On the Finchley-High Barnet section there are no special features that require description. Terminal accommodation at High Barnet consists of three passenger roads, the up platform being of the island type.

For some years road competition has been very severe; practically every station on the three branches being affected. Electric trams pass outside or very near to the stations at Highgate, East Finchley, Finchley, Totteridge, High Barnet, Edgware, and Alexandra Palace; whilst motor buses also serve these and other stations. The Hampstead Tube Railway has a branch which terminates at Highgate, and what traffic there is originating at Mill Hill and The Hale, is also catered for by the Midland Railway.

The run from Moorgate Street or Broad Street to High Barnet or Edgware occupies about 45 minutes. Although some trains miss the three stations between Finsbury Park and East Finchley it is a difficult matter to accelerate the present bookings to any appreciable extent, because of heavy gradients and the crowded state of the line as far as Park Junction. During the "rush hours" 19 down trains are dealt with at Park Junction signal box between 5.30 and 7 p.m. in a normal period, or one train in every 4.73 minutes. Traffic density in the up direction is greater still, as between 7.59 and 9.31 a.m. 26 trains pass, the average interval between them being 3·53 min. A comparison of the present day time-table with that of September, 1867 (at which period only 18 trains ran each way) is interesting, and, incidentally, it reflects the enormous growth of suburban London since the opening, 52 years ago, of the Edgware, Highgate and London line.

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THE NEW CHAIRMAN OF THE MIDLAND RAILWAY COMPANY.

MR. CHARLES BOOTH.

CONSEQUENT upon the death of Mr. G. Murray Smith the Midland Railway directors have elected Mr. Charles Booth, of Elmhurst, Aigburth, Liverpool, to the Chairmanship. Mr. Booth has been deputy chairman for nearly 12 months. As chairman of the Booth Steamship Co., Limited, of Liverpool Mr. Booth controls one of the principal steamship lines sailing out of Liverpool to South American ports, and is also associated with many other organisations as chairman of directors or as a director. In the realm of shipping Mr. Booth plays a very important part, and as a railway chairman it is generally anticipated his prominence will be no less pronounced.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN.

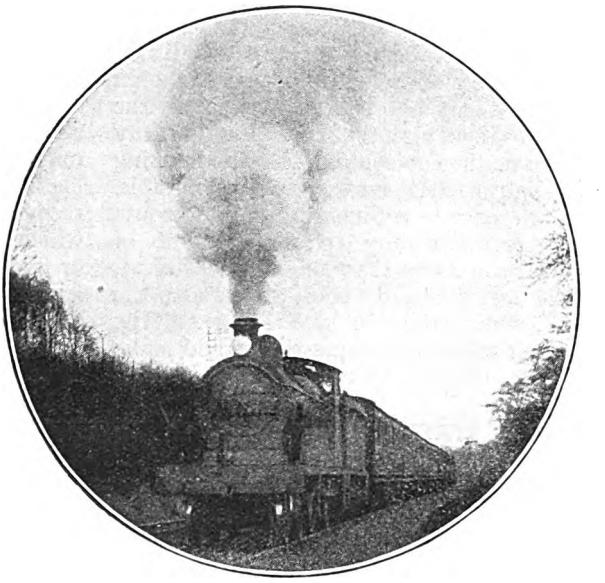

Photo.] [*P. S. A. Berridge.*

SOUTH EASTERN & CHATHAM RAILWAY.

Up train near St. Mary Cray. 4-4-0 locomotive No. 19.

STILL deferred are my hopes of giving a complete review of the post-war time-table changes, as yet further alterations are promised to us for the summer by a number of the large trunk lines. So, as the weather at the time of writing—the latter end of May—is too hot for deep and serious argument in the realm of practice, I will content myself with brief comment on a number of letters from correspondents which have reached me during recent months. The subjects touched upon are diverse in character, but the contents, as always, are most interesting. Let me commence with two bearing on the recent series of articles suggesting the institution of high-speed expresses.

"A few points have occurred to me," writes an old friend from Clapham, "which, as far as I have seen, have escaped comment. First, would not the locomotive on a run of 150 to 200 miles, at 70 m.p.h. average speed, become dangerously near being thrashed? This, of course, refers to large 4-4-0 and 4-6-0 superheaters. The energy needed to maintain an average of 65-70 m.p.h., or even more, is surely far greater in proportion than for a 55-60 m.p.h. average. As witness the present schedules, which presumably take into account frequency of repairs as well as lack of fuel." I do not think it could be said that this particular point has "escaped comment." It was mainly on this ground that I criticised the proposals of other high-speed advocates which, in my opinion, erred fatally in the direction indicated. But the schedules I have outlined are in most cases based on, and, indeed, have a slight margin within the best work I have recorded. It is limitation of the load to 250 or 200 tons that makes all the difference, except, as I have already stated, in the case of such lines as the Great Central or Midland, where the pre-war speeds are capable of but little modification on this load basis.

"Would not the life of the permanent way be shorter, the frequency of renewals be increased, and a larger staff of linesmen be rendered necessary by this higher speed?" the letter continues. In my opinion, and I think I may claim a fairly extensive knowledge of track and track conditions, the effect of high speed on track is over-rated. I could give specific examples of lengths of line on which high speed is run constantly, and which have yet displayed a length of life that is

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nothing less than phenomenal. If maintenance is reasonably good, and the joints are kept well beaten up, save only on very curved stretches high speed should not cause any appreciable increase in the cost of track maintenance. Further, my proposals do not contemplate the running of a lightning express every few minutes, but one or two trains only on each route per day, according to the amount of patronage extended to the new services.

The latter consideration affects also the next observation in the letter. "The speed of the trains in question would make punctual running a necessity, and bearing in mind the delays that abounded around London and other large cities in normal times, any checks *en route* would naturally be more serious than with a slower train. In other words, the trains would have to run to a state of perfection hitherto unapproached." That is certainly the case, but at the same time their comparative infrequency should make it possible to maintain for them a clear path, especially if it were found practicable under nationalisation, or whatever other inter-working arrangements the future may hold, to confine certain main routes principally to passenger traffic, and to divert from them all goods traffic other than that which must necessarily be operated from station to station. As regards permanent way checks, which must occasionally be unavoidable, there is a very slight margin, over and above maximum possibilities, in all the timings I have outlined, and it must also be remembered that the light loads would allow of a much more rapid recovery from slacks than the kind to which we are accustomed with the four or five-hundred-ton trains of to-day. My friend's last point deals with the economic side of the question, but I do not think this needs further argument, as I have already explained that, given a commensurate charge for the use of these "fliers," there could be no question as to whether or not they would pay.

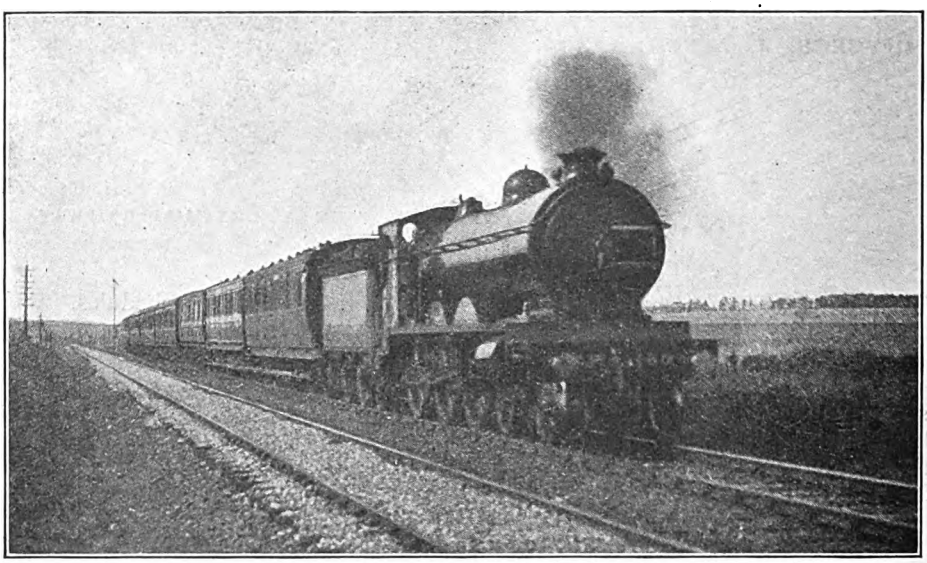

Photo.] CALEDONIAN RAILWAY. [*J. Harper Orr.*

Aberdeen—Glasgow Express. Pickersgill 4-6-0 locomotive No. 60.

A letter from another correspondent raises a different matter in connection with high-speed trains. "When speed is left entirely to the driver's judgment," he writes, "service slacks must necessarily be framed in such a way as to leave a wide margin of safety; consequently there are several service slacks now in force that appear to be absurdly exaggerated. Another result is that existing service slacks are very often taken too cautiously, this, naturally, being a fault to which the best drivers are the most prone. Coming

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through Reading yesterday we averaged 35 m.p.h. for two miles on end, which meant that the actual junctions were taken at about 30 m.p.h., instead of the 40 allowed. Consequently, I think that the engines for your proposed 'Limited Expresses' ought to be fitted with speed indicators, preferably of a type such as the Hasler, which makes a continuous record of the journey speed. This would ensure the proper observance of service slacks, save them from being exaggerated, and, I think, would be a help in regaining time. My reason for the last statement is this. If a regaining-time premium is combined with a coal premium the temptation is for a driver to save time where he can without a corresponding expenditure of coal, *i.e.*, by cutting service slacks."

With everything my friend has said I am in absolute agreement. In such matters as automatic speed recorders (not to mention automatic couplings and other long overdue railway requisites, which would probably, in the long run, far more than recoup their first cost) our conservatism has kept us behind the times in this country. No express engine, in my opinion, should be without the essential equipment referred to, and it seems to me that the gain in journey times and in aggregate reduction of fuel consumption, due to the abolition of the "extra" safety margin in speed restrictions, referred to in my correspondent's letter, and the consequent raising of many of the present excessive limitations of speed, should much more than outweigh the comparatively trifling cost of the installation. From the safety point of view alone it seems absurd to leave so vital a matter as the observance of speed restrictions to a driver's unaided judgment. Analysing the results of my own observations I should say that, as a general rule, British speed orders are exceeded by an average of not less than 10 m.p.h., and one might as well leave the motorist to estimate, without any speed indicator, his legal maximum of 20 m.p.h., and at the same time abolish all "speed traps," as expect the driver of a locomotive, without mechanical assistance of any kind, to estimate with accuracy the speed at which he is travelling. And it is certainly the case that safe running, as well as coal consumption and time-keeping, should be taken strictly into account in fixing any bonus to the engine crew in connection with the running of express trains.

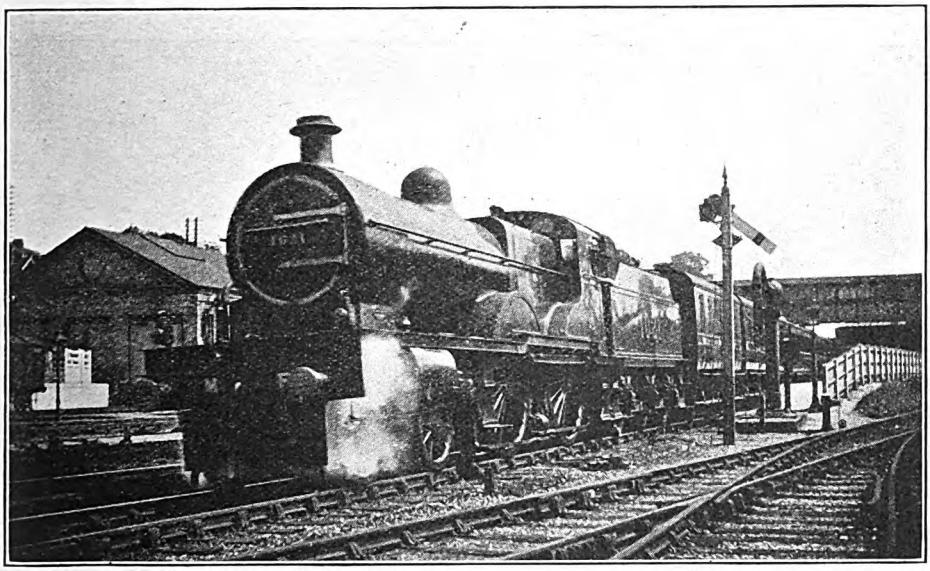

Photo.] MIDLAND RAILWAY. [*F. H. Stingemore.*

1.40 p.m. St. Pancras—Manchester train (Sundays) passing Radlett. 4-4-0 compound locomotive, No. 1021.

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My friend writes further: "Whilst on the subject of service slacks I rather fancy that *Wild Duck* on her famous run passed Wolverton and Weedon at 70 m.p.h. or thereabouts, while between Shap and Penrith *Penmaenmawr* ran at a sustained speed of over 80, and I should like to recall to you your remarks in the latter case as to the perfect propriety of fast running over a track laid out and super-elevated for high speed." Yes, the respective rates at Wolverton and Weedon on the former run were, I admit, 77½ and 66¼ m.p.h. respectively, and I agree that these curves should not be put upon the same plane of severity in speed restriction as, say, Wigan or Penrith, even if any restriction at all is needed in the former cases. But the 80 m.p.h. maximum referred to north of Shap was moderated over several of the sharper curves, and especially through Penrith, where speed was substantially reduced, as it ought to be.

"A final point," the letter continues, "I have a very good opinion of Great Western Railway 4-6-0's, but I must say you have set them some stiff work. Paddington-Newport in 2 hours, Paddington-Birmingham in 1¾ hours—I don't say they can't do it, but there is no margin that I can see, at any rate with service slacks as they are now. To pass Southall in 10 min. from Paddington wants doing. Compare also Westbury to mile-post 122¾, 12⅞ miles in 15 min. (by the way, I have done it in 14 min. 38 sec. with eight 70-footers, or 275 tons in all, on my only down journey by that route!) with Essendine-Stoke, Great Northern Railway, 11½ miles in 13½ min." My correspondent gives away his case with the admission that he has actually bettered one of the only two point-to-point timings to which he takes exception, and further forgets that this stretch follows some 25 miles of very favourable road, whereas the Great Northern case cited concludes an equally long section almost entirely adverse. I do not dispute that many of my suggested point-to-point times might be improved by slight intermediate adjustments, but still claim that the long distance times are, in the main, feasible in all the conditions outlined. It would, of course, be necessary to traverse all speed restrictions at the maximum safe and reasonable limit of speed.

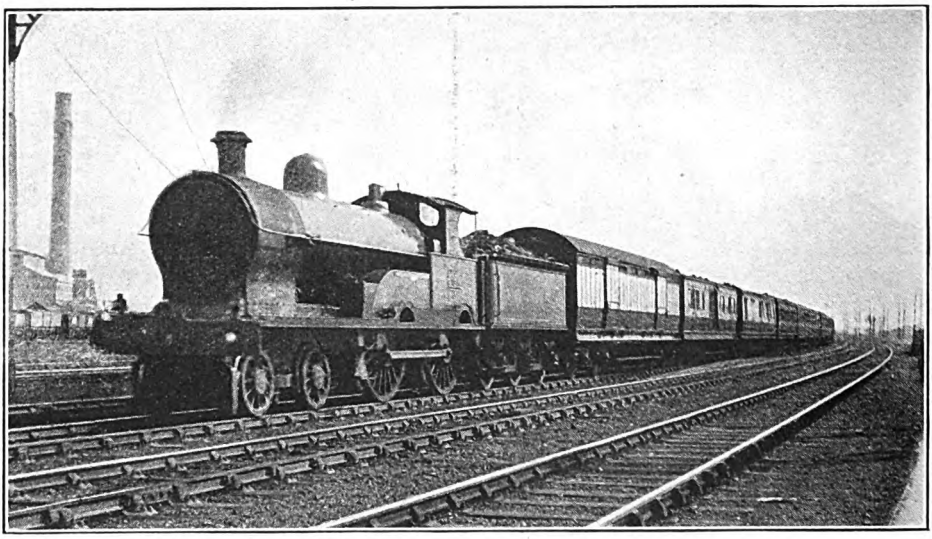

Photo.] LONDON & NORTH WESTERN RAILWAY. [*F. W. Curtis.*

Euston—Birmingham Express. 4-4-0 locomotive No. 882 "Canada."

Next comes a letter inquiring, *mirabile dictu*, from the wilds of West Africa, where the writer assures me that the point in question is actually "worrying" him: "How do you estimate the speed of trains which you are timing? For instance, you say 'speed rose to 56½,' or

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'speed was sustained at 62 m.p.h.' Does this require an accurate knowledge of the distances between various points and the assistance of a stop watch, or does it need access to the railway companies' working time-tables, which give, I understand, the times trains are due to pass stations at which they do not stop? I do not often get an opportunity of timing a train, but would like to know the best way about it." The plan of timing is simple enough, but only long-continued practice can acquaint the observer with all the salient features of a route, and afford the experience which makes for accuracy. My method is, first of all, to take the actual passing times at all intermediate stations (unless they are very close together) with the ordinary second hand of my watch, reading at the centre of the station to the nearest 5 sec., together with the time of passing important summit or other "strategic" points, *e.g.*, mile-post 122¾ on the Great Western Railway main line *via* Westbury, or Stoke, Markham and Piper's Wood signal boxes on the Great Northern Railway.

Beginners can obtain station-to-station distances to the nearest ¼-mile, with fair accuracy, from *Bradshaw's Guide*. Exact chainages can only be obtained from the working time-tables of the company concerned, which also give the scheduled passing times of non-stopping trains at the principal stations *en route*. But these are difficult of access to the ordinary mortal who has, in most cases, to rely on the times given in the public books and sheets for comparison with the times he records. These data should also be supplemented by details of minimum uphill speeds and maximum speeds on the level and downhill. Such figures can only be obtained with any accuracy by the use of a stop-watch, taking the times occupied in covering ¼-miles either from the ¼-mile posts always found at the line-side, or, if access to the compartment window on that side is not obtainable, from the rail-joints, as the train passes over them. The latter method (which I dealt with at considerable length in the May, August, and October issues of 1916) requires, however, a very considerable amount of practice to be in any degree accurate. Delays should be carefully noted, together with the amount of speed reduction involved, and the cause, if ascertainable.

In addition to all these details the log should include the number and type of the engine concerned, the type of weather, and direction of the wind (if any), and accurate details of the load. "How can you estimate the weight of a train, whether

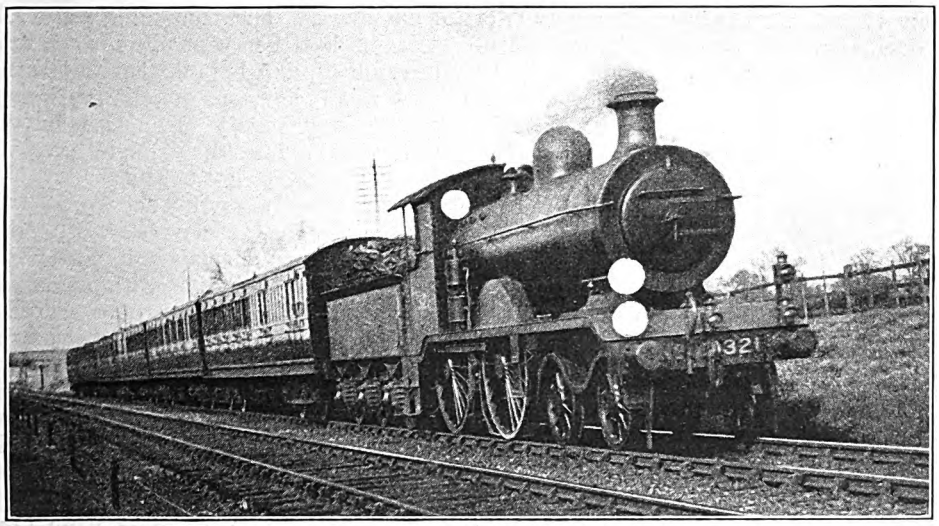

Photo.] LONDON, BRIGHTON & SOUTH COAST RAILWAY. [*F. W. Curtis.*

London Bridge—Portsmouth express. Re-built 4-4-0 locomotive No. 321.

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empty or full?" enquires another reader. As far as the weight goes, by reading it off the ends of the coaches on the London and North Western, Midland, Great Northern, North Eastern, North British, Caledonian, and Glasgow and South-Western Railways from small tablets just below the roof in all cases except those of the Caledonian and London and North Western Railways, where it is found in raised white letters about the waist-line. On the Great Central, Great Western, and London and South Western Railways the weight is given at the end of the coach immediately above the footboard—an unnecessarily awkward place, by the way, for convenience in use. So far as I am aware no other companies offer details of their coach-weights to the observer visually, and the weights concerned must be obtained by other means. At the same time details of the vehicles making up the train, and the number of axles should accompany the log. As regards the addition to be made to tare weights in respect of passengers and luggage, I dealt with this subject in the September issue of 1918, but for the present it is sufficient to say that not exceeding 10 per cent. should be added for a corridor train really packed, and for other degrees of repletion or the reverse a proportionate amount.

Timing, or, should I say, timing that is likely to have any subsequent value, is thus a serious business, demanding close attention throughout the journey. I cannot refrain at this stage from poking some fun at the correspondent last-mentioned, who kindly enclosed with his letter a log of his own timing. Here it is—in full. "I was travelling from Perth to Forfar on a bright sunny day on the ex-Glasgow 9.45 a.m. Grampian Corridor Express. The engine was a 2-4-0 (large radius driving wheels)"—apparently one of Benjamin Connor's masterpieces unearthed from some obscure branch for the occasion—"but I forgot to note the number. Next to the engine came two non-corridor eight-wheelers which had been put on because it was Easter Monday and a Glasgow holiday. Besides these there was a Pullman dining saloon and six 12-wheeler corridor carriages. This completed the train, and people were standing in the corridors, which shows that train was full up! We left Perth five minutes late at 11.55 a.m., and lost about 10 minutes at the viaduct over the Tay at Cargill. The Caledonian Railway Company are rebuilding this, and a very fragile single line takes the place of the old double line, with the result that trains are only allowed to cross the viaduct at four miles an hour, which is snail's pace! I calculated that our train lost seven minutes in crossing, and I am sure that we could give it another three minutes for the loss of speed, making a total loss of ten minutes! Unfortunately I did not take the times as we passed the first few stations, but we stopped at Coupar Angus in 37½ min. Stopped at Alyth Junction in 42 min. Passed Eassie in 50¼ min., Glamis in 53 min., and arrived in Forfar in 59 min. from start. The time-table only allows 51 min., but then we had an exceptionally heavy load, and I think that the train did very well! Perhaps my observations give you a very scanty idea, as I have not taken all the times that I might have taken, but it may be of use to you."

"Scanty" is not the word! Had my correspondent diverted a little of the energy he has displayed in liberally bestrewing his narrative with exclamation marks (of which I have only reproduced about 5 per cent. in the above quotation) to the somewhat more important operation of noting the time at which he *left* as well as reached the stations at which the train stopped, we might have had some idea as to how long it took to run from place to place. Seeing that Alyth Junction is 4¾ miles from Coupar Angus, even if we allow only one minute for performing station work on Easter Monday and a Glasgow holiday, we are left to perform the journey in the somewhat startling start-to-stop time of 3½ min. Good work this for a Connor 2-4-0!—were it not without doubt that my correspondent's train was hauled by a modern 4-4-0, which puts a somewhat different complexion on the matter.

My friend must forgive this drastic treatment of his letter, but I have reproduced it in full as a classic example of how *not* to time trains. And may I take this opportunity of beseeching correspondents who are kind enough to send me logs for perusal not to resort to the "prose" method of doing so? Imitation is, undoubtedly, the sincerest form of flattery, but train times concealed amid a wealth of descriptive matter, and generously

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besprinkled with superlative adjectives, are exceedingly difficult for the unfortunate writer of these pages to follow. No form is so useful for reference as the *tabular* log, of which I gave a series in my "century" article of last October. And might I also suggest, without any desire for self-advertisement, that novices in train-timing would do well first to study the articles of this series? They will find in them many details as to loads, gradients, "strategic" timing points, and, over the course of years, a miscellany of information on the subject that cannot but prove instructive in the art of recording locomotive performance.

Mention of the Caledonian Railway reminds me of my most recent runs on that system, although, truth to tell, none of the Scottish companies for a considerable time past has been able to offer anything in the way of performance that could be described as particularly interesting or in any way approaching pre-war standards. On the Caledonian, in particular, even war-time loads offer little in the way of running that is worthy of record, as piloting is freely resorted to in almost all cases of extreme loading. For example, the 2.30 a.m. from Carlisle to Perth—on the occasion of my travelling a 63-axle train of 419 tons tare and 460 tons gross weight—was hauled by two superheater 4-4-0 engines, No. 114 of Mr. Pickersgill's design leading, and No. 46, a McIntosh engine, next the train.

We passed Gretna, 8·6 miles, in 12 min., with a maximum of 60 m.p.h., and maintained 42 m.p.h. up 7⅜ miles at 1 in 193-200, passing Kirtlebridge, 16·7 miles, in 22 min. 40 sec. Here we touched 56½ m.p.h., afterwards ascending the 4-mile length of 1 in 200-203 past Ecclefechan at a minimum of 43 m.p.h. This took us through Lockerbie, 25·8 miles, in 33 min. 20 sec., and once again reaching the mile-a-minute rate we passed Wamphray, 34·5 miles, in 42 min. 50 sec. Then came a dead stand for signals at Mackealty Box—a place of somewhat evil reputation in this respect, in my experience—so that our total time to Beattock was no less than 67 min. 5 sec. Net time for the 39·7 miles was 50 min.; schedule is 52 min. From Beattock, banked in rear, we climbed the 10 miles at 1 in 69-88 to Summit in 23 min. 20 sec., and then ran under the easiest steam down to Lamington, not touching 60 m.p.h. until we crossed the Clyde at 61½; so the 17.2 miles from

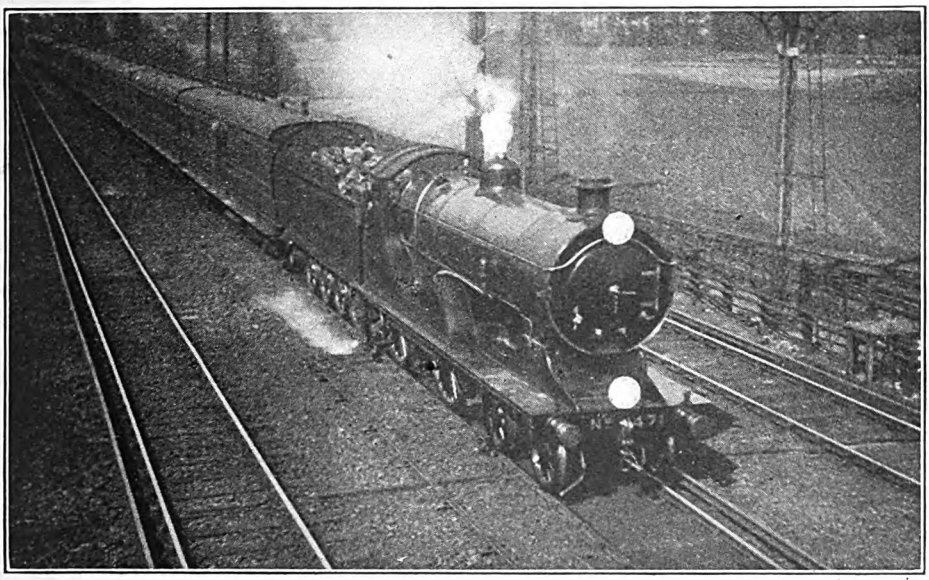

Photo.] LONDON & SOUTH WESTERN RAILWAY. [*F. W. Curtis.*

West of England Express near Wimbledon. 4-4-0 superheater locomotive No. 471.

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Summit to Symington occupied 19¼ min.; the 6.6 miles on to Carstairs (where speed was reduced to 45 m.p.h.), 7 min. 40 sec.; the 10.6 miles from Carstairs to Law Junction, 12 min. 35 sec.; and the final 5.4 miles to Motherwell, where we stopped, as scheduled, in order to detach the two rear vans for Glasgow, 8 min. 5 sec. On account of colliery subsidences we ran very slowly over the last-mentioned stretch. Total time from Beattock to Motherwell, 49.8 miles, was thus 70 min. 55 sec.; the working book allows 75 min. After this we were so hopelessly delayed all the way to Perth that the remainder of the run was not worth timing.

Another run in the same direction was timed by a young Scottish friend on the 4.15 p.m. out of Carlisle, with a tare load of 451 tons, and a full load of 480 tons, the engines in this case being a superheated "Dunalastair II."—No. 769—and a Pickersgill 4-6-0—No. 63. Gretna was passed in 12 min. 25 sec., and Kirtlebridge in 22¾ min., Lockerbie being reached in 34 min. 25 sec.—times closely corresponding to mine. Schedule to Lockerbie stop was for this train 37 min. Re-starting, the two engines passed Wamphray, 8.7 miles, in 11½ min., and reached Beattock, 13.9 miles, in 19 min., against an allowance of 20 min. From Beattock, Summit was passed in 23 min. 10 sec., and a sluggish descent was made to Symington, very similar to that timed by me, Summit to Symington stop occupying 19¾ min. The 27.2 miles from Beattock to Symington thus occupied 42 min. 55 sec., although allowed 44 min. Symington to Carstairs was run in 10 min. 10 sec., or, roughly, as booked. Between them the two engines thus gained 4½ min., although, of course, all these timings are very easy.

In the opposite direction I have travelled twice by the 9.45 p.m. express from Glasgow to London. On the first occasion, No. 114, which has already figured in the last run but one, was piloted to Beattock Summit by No. 767, a "Dunalastair II.", the load of 56 axles totalling 378 tons tare and 395 tons full. We were stopped by signal for ¾ min. at Newton, having covered this initial 6.8 miles stage in 12 min. 35 sec., start-to-stop. The next length of 6.6 miles to the conditional stop at Motherwell took 12 min. Between Motherwell and Carstairs, in addition to the continuous and severe climb, we were checked by signal to a walking pace at Law Junction, and suffered a p.w.r. check also near Braidwood,

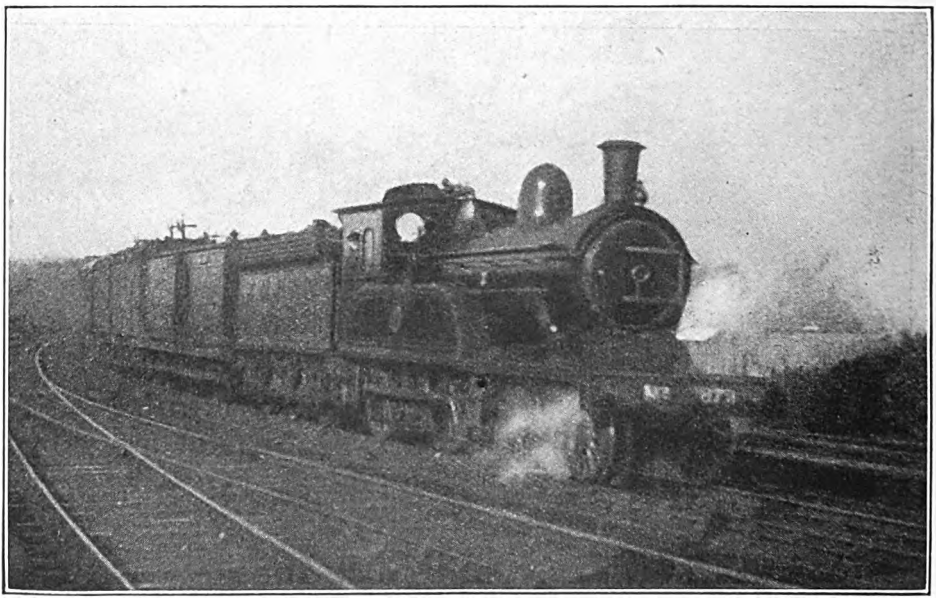

Photo.] NORTH EASTERN RAILWAY. [*Keith Gilfillan.*

Leeds to West Hartlepool train. 4-4-0 engine No. 1879 (Class Q).

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so taking 31 min. for this section of 16 miles, start-to-stop. From Carstairs we covered the 23.8 miles of more moderate climb to Summit in 33 min. 40 sec., and from there, unpiloted, passed Beattock, 10 miles, in 13 min. 10 sec. (running very moderately down the bank); Gretna, 41.1 miles, in 47 min. 25 sec.; reaching Carlisle, 49.7 miles, in 57 min. 20 sec. For the last-mentioned stretch, pass to stop, the working book allows 58 min., and from Carstairs to Summit, 37 min., while even from Motherwell to Carstairs (a working stop only), 33 min. are shown, so that the running generally was well inside schedule.

On the second trip, with a 52-axle train weighing 367 tons empty and 390 tons full, we were horsed by No. 123, a McIntosh superheater, and were not piloted. Glasgow to Motherwell took 21½ min., start-to stop, and from here we were banked in rear to Craigenhill Box, passing Law Junction, 5·4 miles, in 12 min. 25 sec. (32 m.p.h. had been attained on the 1 in 137 at Flemington, but this rate fell to 29½ on the 1 in 99 past Law Junction), and reaching Carstairs in 29 min. 5 sec. Leaving there dead on time, at 10.45 p.m., we passed Symington, 6·6 miles, in 13 min. 25 sec., Lamington, 10·3 miles, in 18 min. 25 sec., at 56½ m.p.h., and then ran the 13·5 miles up to Summit without assistance in 21 min. 35 sec.—total exactly 40 min. from Carstairs, or 3 min. over schedule. Minimum speed on the concluding 2¼ miles at 1 in 99 was 23½ m.p.h. Summit to Beattock, 10 miles, took 10¾ min., with a modest maximum of 68 m.p.h., and many slacks; while the 13·9 miles on to Lockerbie were covered in 15¼ min., a minute of the arrears having thus been regained. Probably the remaining 2 min. might have been regained had we not thereafter been so badly checked by signals as to spoil the rest of the run.

Northward from Buchanan Street, Glasgow, my last run was on the 9.45 a.m. express, when No. 150, non-superheated large 4-4-0, had to haul a 48-axle train weighing 318 tons empty and 335 tons full. Immediately after clearing the platform we stopped for a bank engine in rear up the 2¾ miles at 1 in 79-98-125 to Robroyston, restarting 2¾ min. later. From the second start we passed Steps Road, 4·5 miles, in 10¼ min.; Glenboig, 8·9 miles, in 16 min. 35 sec.; Greenhill, 18·5 miles, in 27 min. 50 sec.; Larbert, 22·1 miles, in 31 min. 55 sec.; and reached Stirling, 30·1 miles, in 42½ min., or 45¼ min. from the platform start at Buchanan Street, the time allowed being 45 min. At no point on the sharp descent from Cumbernauld was speed allowed to exceed 60 m.p.h., and speed was eased through Larbert.

In the opposite direction a correspondent

Photo.] GREAT WESTERN RAILWAY. [*J. F. Dearden.*

Up express passing Ealing (Broadway). 4-6-0 locomotive No. 2901, "Lady Superior."

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has sent me details of three runs on the 9.5 a.m. (9.7 a.m. working time) from Stirling to Glasgow, the first having a stop at Larbert, as on the winter time-table, and the other two being non-stop. No. 894, "Dunalastair III." class, was the engine on the former run, with a load of 275 tons to Larbert and 250 tons beyond. The somewhat impossible allowance of 11 min. to Larbert was not maintained, the time taken being 13 min. 10 sec. for the 8 miles. From Larbert No. 894 passed Greenhill, 3·6 miles, in 6 min. 42 sec., and Cumbernauld, 9 miles, in 13 min. 22 sec.—an excellent feat, seeing that this distance includes 4¾ adverse miles at 1 in 98-128—and then covered the 8·6 miles on to Steps Road in 8 min. 35 sec. The descent to Buchanan Street was run very cautiously, this final 4·5 miles taking 7 min. 6 sec., and making up the total time from Larbert, 22·1 miles, to 29 min. 3 sec., or 3 min. under schedule. In comparison with this the efforts of No. 776, a "Dunalastair II.," with 210 tons, and 895, another "Dunalastair III.," with 235 tons, were somewhat feeble. Their times were: to passing Larbert (where No. 776 was somewhat badly checked), 13 min. 35 sec. and 12 min. 27 sec., from Larbert up to Cumbernauld, 15 min. 25 sec. and 14 min. 31 sec.; from Cumbernauld to Steps Road, 10 min. 28 sec. and 11 min. 5 sec. (speed here on both runs being maintained at very little over 50 m.p.h. against No. 894's 60-65); and Steps Road into Glasgow, 6 min. 22 sec. and 6 min. 57 sec. Total times were thus 45 min. 50 sec., or 44 min. net, and exactly 45 min., the latter being a minute over the time allowed to the non-stop train.

Further north I have three runs from Perth to Stirling, one of my own timing, and two from a northern correspondent, on the 4.33 p.m., 8.50 a.m., and 2.47 p.m. trains (allowed 44, 48, and 54 min. respectively for the 33 miles), in each of which cases a superheater 4-4-0 was employed. Loads were in proportion to the time allowances, No. 116, in the first case, having to tackle a 34-axle train weighing in all 225 tons, No. 41 one of 38 axles or 265 tons, and No. 934 one of 54 axles or 375 tons. The last-mentioned was a tremendous train with which to face the 7-mile bank at 1 in 90-121, which extends from Dunning to Gleneagles, more especially as the apparently easy timing includes a 2 min. conditional stop at Bridge of Allan. Out of Perth Forgandenny, 3·9 miles was passed in 6¾ min., 7 min. 35 sec., and 8 min. 55 sec.; the 5·8 gradually rising miles thence to Dunning were covered in 5 min. 51 sec., 6 min. 35 sec. and 8 min. 3 sec.; and the 7·2 miles of steep ascent on to Gleneagles in 10 min.

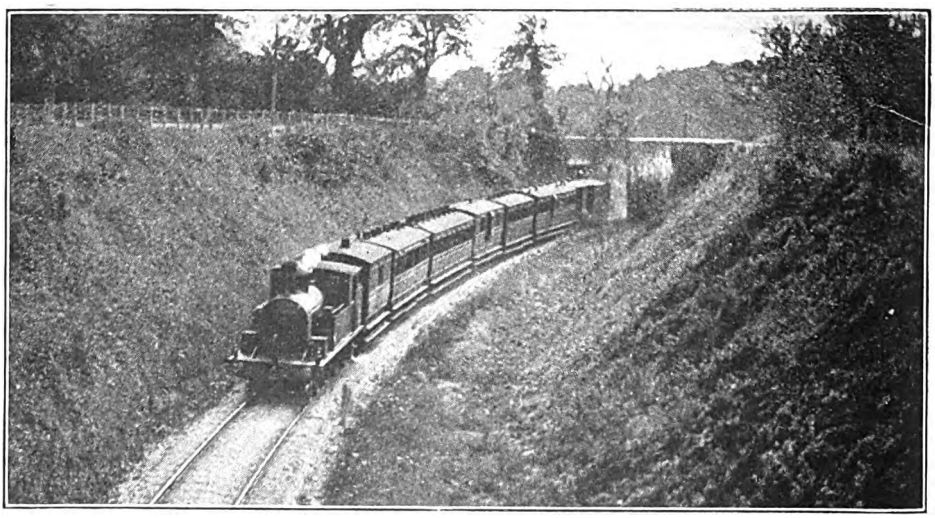

Photo.] CORK, BANDON & SOUTH COAST RAILWAY. [*D. B. Bradshaw.*

Train approaching Bandon from the south. 4-4-2 tank engine No. 3.

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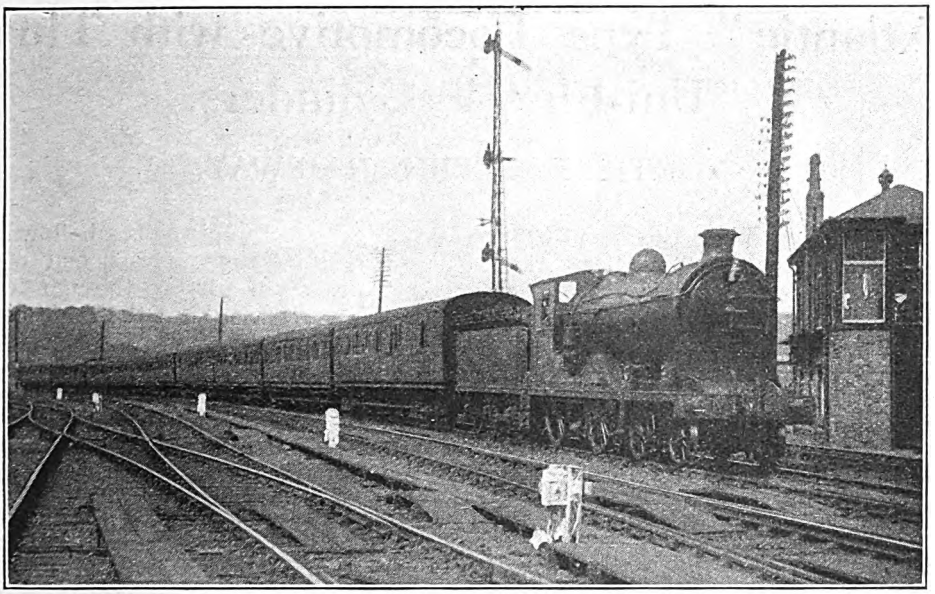

Photo.] NORTH BRITISH RAILWAY. [*Chas. S. Lake.*

Perth—Edinburgh train approaching Inverkeithing. 6-ft. 4-4-0 superheater locomotive "Glen" class.

24 sec., 10 min. 55 sec., and 12 min. 10 sec. —total 23 min., 25 min. 5 sec., and 29 min. 8 sec. for the 15·8 miles out of Perth, against bookings of 24, 27 and 27 min. Minima on the first and last runs before Gleneagles were 34½ and 24 m.p.h. respectively.

From Gleneagles the 6·4 slightly falling miles to Greenloaning were run in 8 min. 1 sec., 8 min. 25 sec., and 9 min. 29 sec., the 5·8 miles on to Dunblane, steeply falling after Kinbuck, occupying 5 min. 58 sec., 6 min. 5 sec., and 6 min. 6 sec. The five miles from Dunblane to Stirling stop were run in 4 min. 53 sec., 6 min. 25 sec., and 5 min. 10 sec. (passing in the last-mentioned case), making totals of 41 min. 52 sec., 46 min., and 50 min. 3 sec. from Perth, 33 miles, or in each case well inside schedule time. On my own (the second) run, a much better time would have been secured by faster running down Dunblane bank; by copying the speed of the first run, for example, we should have arrived easily in 44 min. As it was, however, we did not even touch the mile-a-minute rate, and slackened speed frequently, whereas, on the first and third runs the recorded maxima were in both cases 70 m.p.h. A further excellent run north of Perth, as well as one or two on the neighbouring North British line, I must hold over until the next issue, as I have now fully occupied my allotted space.

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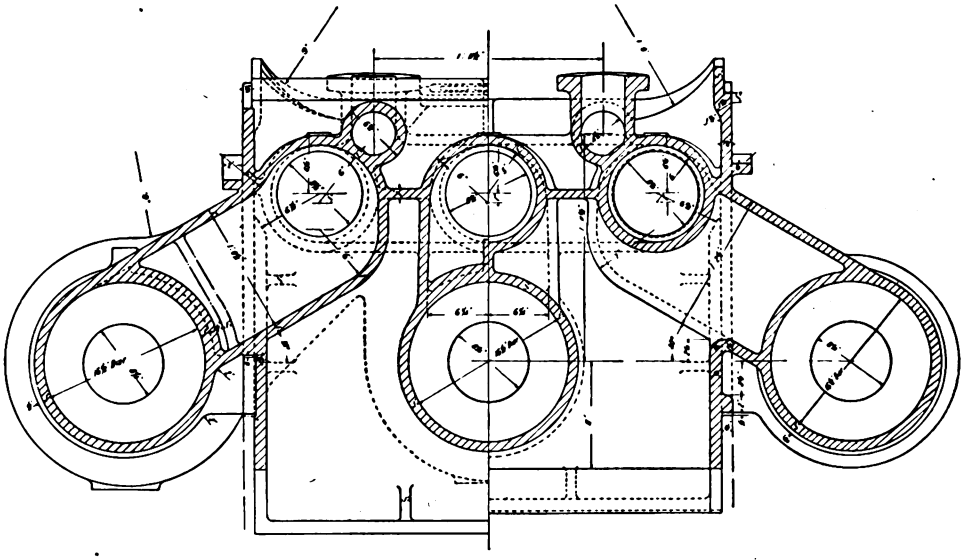
"Atlantic" Type Locomotive with Three "Uni-Flow" Cylinders.

NORTH EASTERN RAILWAY.

OUR colour plate this month illustrates a new "Z" class three-cylinder 4-4-2 engine recently constructed by Sir Vincent L. Raven, Chief Mechanical Engineer, North Eastern Railway, at the Darlington Works, wherein the cylinders are designed on the "Uni-Flow" principle, but in other respects corresponding with other locomotives of the same general class.



CROSS SECTION THROUGH UNI-FLOW CYLINDERS, N.E.R. ATLANTIC TYPE LOCOMOTIVE.

It will be remembered that in 1913 a 4-6-0 two-cylinder engine, No. 825, was built with "Uni-flow" cylinders, so that the new locomotive may be considered as carrying on the test of this principle of working, wherein the steam entering at one port does not have to return to the same point, but escapes through an exhaust port provided in the middle of the cylinder barrel. The steam, therefore, has only a forward movement; hence the term "Uni-Flow." The piston in a "Uni-Flow" cylinder is called upon to govern the exhaust instead of, as in the usual type, leaving that function to the slide or piston valve. The piston is a hollow casting with spring rings at each end to prevent any steam passing through to its other side. It is claimed that this piston being hollow and full of air protects the live steam side of the piston from the disadvantageous effects which the ordinary narrow piston possesses, due to its being a single solid surface, one side or the other of which is always wet from exhaust steam. Owing to the fact that the exhaust is in the middle it is necessary to increase the length of the cylinder to about double what it would otherwise be in order to allow the steam which enters through the port at one end of the cylinder to press forward the piston for the same length of time or distance before exhaust as is done in the case of the ordinary engine.

The original "Uni-Flow" engine, as compared with contemporary engines of the same class, was greatly altered consequent upon the substitution of "Uni-Flow" for the ordinary type of outside

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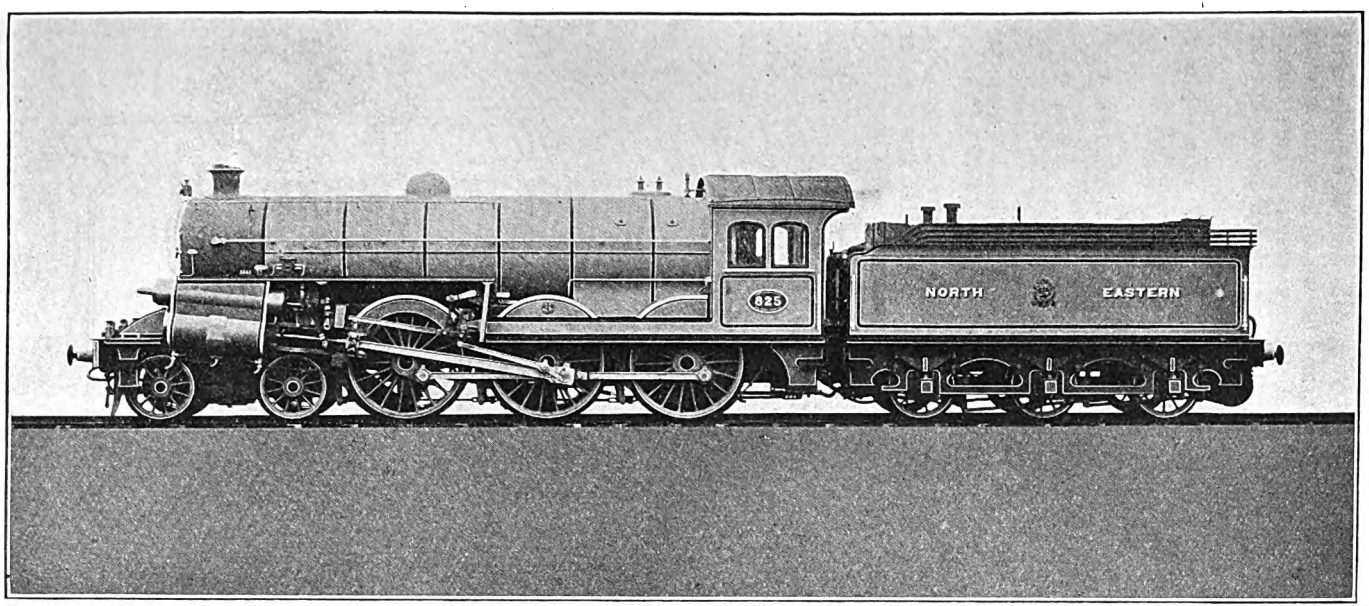

4-6-0 ENGINE FITTED IN 1913 WITH TWO "UNI-FLOW" CYLINDERS, NORTH EASTERN RAILWAY.

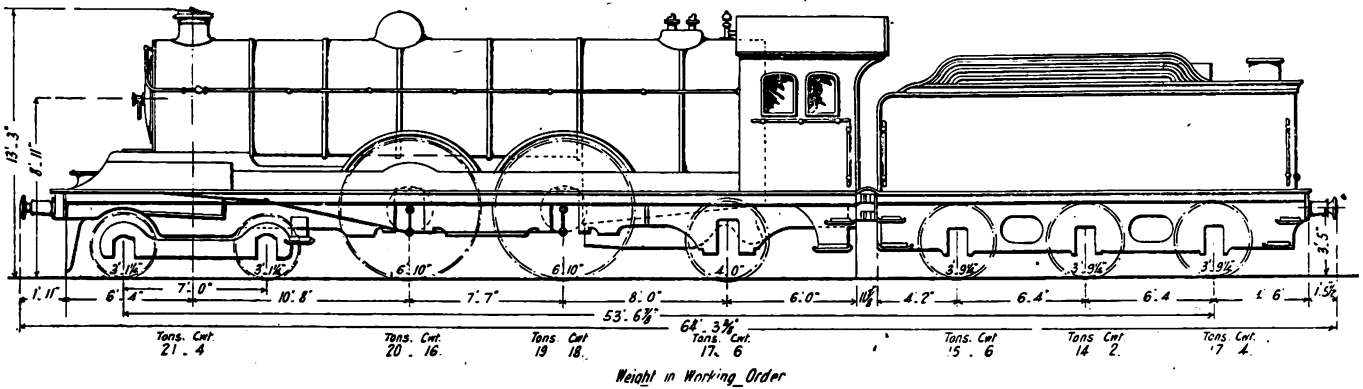

DIAGRAM OF CLASS "Z" LOCOMOTIVE FITTED WITH THREE "UNI-FLOW" CYLINDERS, NORTH EASTERN RAILWAY.

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cylinder, with valves at the side operated by inside valve gearing. In the new "Atlantic" type locomotive, however, the "Uni-Flow" principle has been incorporated without substantially affecting the appearance of the engine. The modification in appearance is, indeed, so slight that a casual observer would hardly notice any difference between this and the other "Z" engines, and its adoption has in no wise interfered with the symmetrical lines of the design. The cylinders in this engine are of the same proportions as those of the standard "Z" class, viz., 16½ in. diameter by 26 in. stroke.

The special equipment has involved a redistribution of weight as follows:—

"Ordinary" Z type engine.

On bogie, 19 tons, 1 cwt.
,, driving wheels, 19 tons 18 cwt.
,, trailing, coupled, 19 tons 19 cwt.
,, ,, wheels, 18 tons, 4 cwt.

"Uni-Flow" Z type engine.

On bogie, 21 tons 4 cwt.
,, driving wheels, 20 tons, 16 cwt.
,, trailings, coupled, 19 tons 18 cwt.
,, ,, wheels, 17 tons 6 cwt.

The new locomotive is at present running in the main line express services between York and Newcastle and Newcastle and Edinburgh, and is, we understand, giving entirely satisfactory results. Particulars other than those mentioned above appear in the table below:—

Boiler, length	15 ft. 10½ in.
,, diameter	5 ft. 6 in.
Firebox, length	9 ft.
Heating surface, tubes (90 × 2 in. diameter)	763·9 sq. ft.
Heating surface, tubes (24 × 5 in. diameter)	531·9 sq. ft.
Heating surface, elements ...	530·1 sq. ft.
,, ,, firebox ...	180 sq. ft.
,, ,, total ...	2,005·9 sq. ft.
Grate area	27 sq. ft.

The tender, which is carried upon six wheels of 3 ft. 9¼ in. diameter, has a water capacity in the tank of 3,669 gallons and in the well 456 gallons, a total of 4,125 gallons. A coal space of 5½ tons is provided. It is of self-trimming type, weighing in working order, 46 tons 12 cwt., which, added to the 79 tons 4 cwt. of the engine, gives a total of 125 tons 16 cwt.

RAILWAY YEAR-BOOK, 1919. 30, Fetter Lane, E.C. 5s. net. With so many questions affecting transport now under discussion the Railway Year-Book has more than usual interest at the present time. The book covers the field of railway work very comprehensively, from the historical, statistical, legal, and personal standpoints. Apart from the strictly official details there is an abundance of miscellaneous information admirably compiled.—*The Financial News.*

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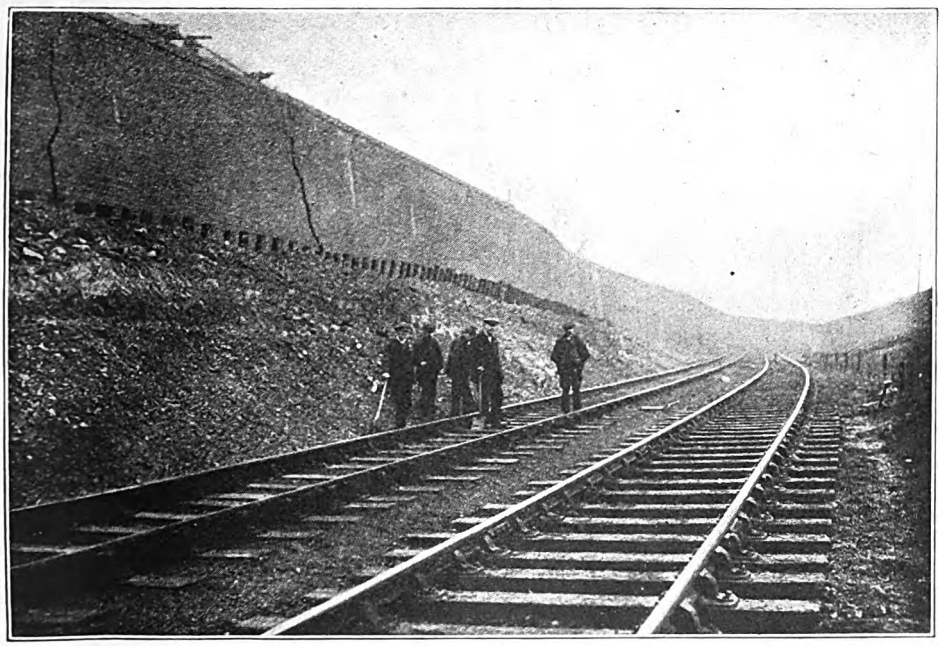
Railway Landslides: Engineering Problems at Wembley and the Warren.

GREAT CENTRAL AND SOUTH EASTERN & CHATHAM RAILWAYS.

CONSTRUCTION, maintenance, and upkeep of railways involves abundant scope for the engineering departments of great railways, but occasionally events occur which no amount of skill or foresight can anticipate or guard against, such as landslides, subsidences, &c., due to causes, natural or otherwise, over which man has no control. There are, in fact, treacherous sections of line in many places where continual watchfulness is necessary; but, as a rule, safeguarding measures can be taken in time. Now and then a subsidence or landslip occurs without warning, as in the case of that which caused the Little Salkeld accident on the Midland Railway some time ago; but in nearly every instance necessary action can be taken in time to avoid any risk to traffic, though it may be that considerable trouble and expense is involved before the situation can be restored.

During the war at least two important examples of exceptional difficulties occasioned by causes over which man has no control have occurred affecting main lines of railways, one in Wembley cutting, Great Central Railway, and the other between Dover and Folkestone, South Eastern and Chatham Railway. The former has been remedied by engineering skill, and permitted of temporary means of working traffic being restored very quickly; but the latter may involve the construction of an entirely new line to complete the



VIEW THROUGH WEMBLEY CUTTING, GREAT CENTRAL RAILWAY.
Showing Temporary Diversion of Permanent Way round the Site of the Slip.

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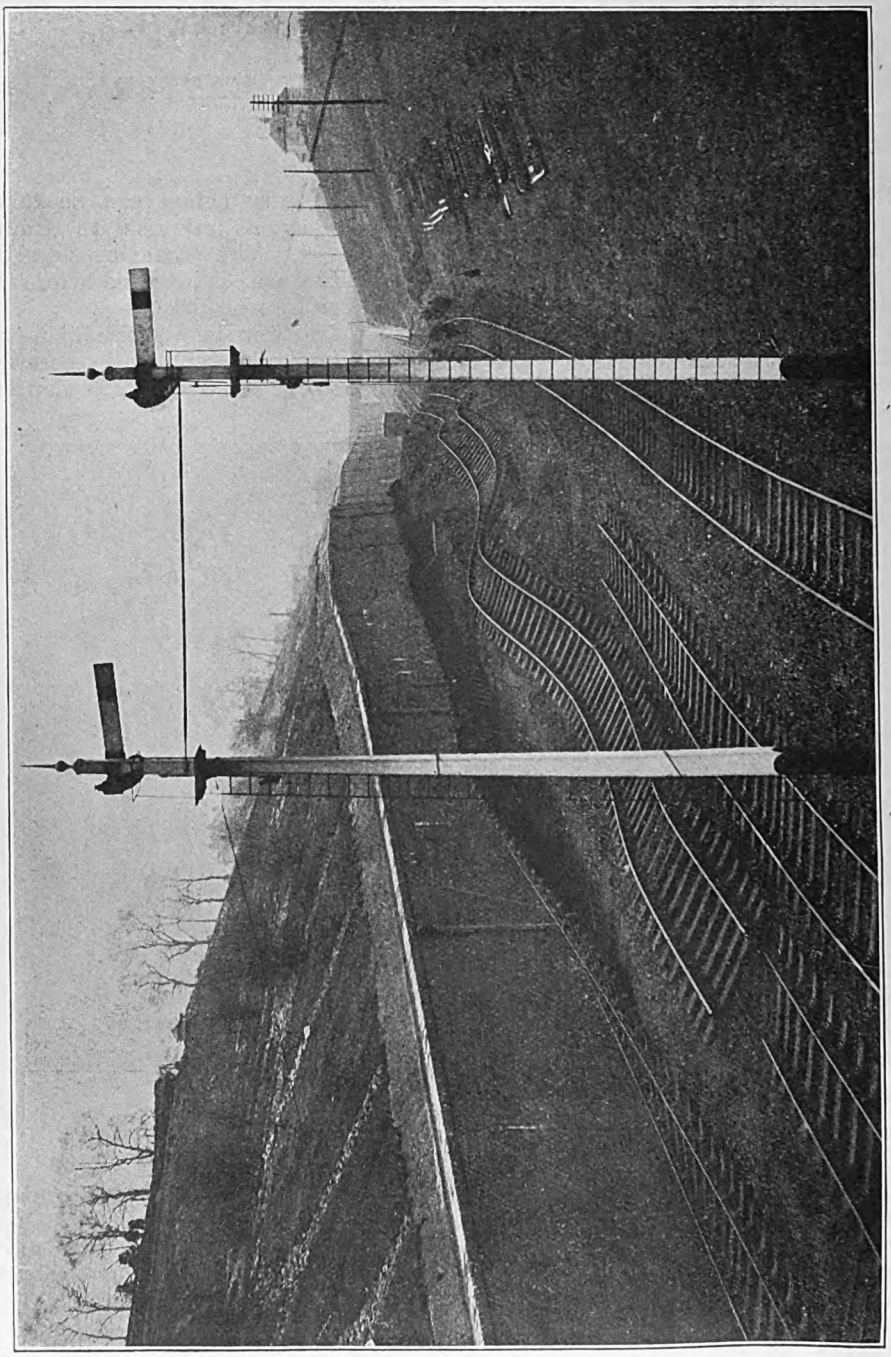

SLIP AT WEMBLEY CUTTING, GREAT CENTRAL RAILWAY.
View looking East showing Damaged Permanent Way, Movement of Wall, and Slip above the Wall.

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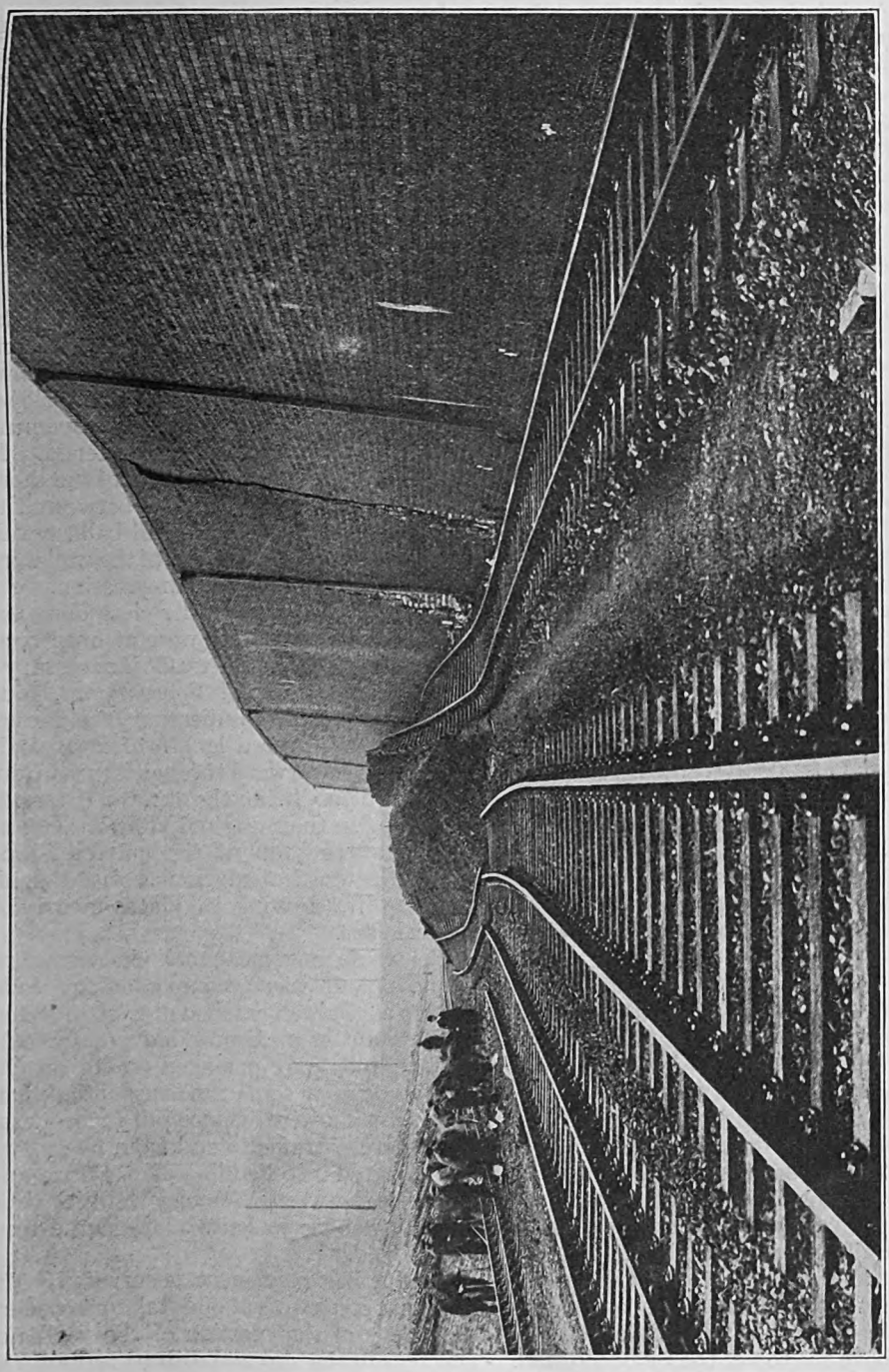

SLIP AT WEMBLEY CUTTING, GREAT CENTRAL RAILWAY.
View looking West showing Position of Retaining Wall after Slip and Damaged Permanent Way.

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broken line of communication, though the final course to be adopted is not yet settled.

The Wembley Cutting slip occurred in February, 1918, on the main line of the Great Central Railway to London *via* High Wycombe near Wembley Hill Station. The cutting is nearly a mile long, the station being about midway between the two ends. The slip occurred in the portion of the cutting lying to the west of the station and on the up side of the line.

This portion of the cutting has a maximum depth of about 60 ft. measured above the centre line of the railway, but the greatest depth at the top of the slope on the up side where the slip occurred is about 80 ft. above rail level. Four lines of way pass through the cutting, *i.e.*, up and down fast lines in the centre and up and down slow lines on the outsides. There is a falling gradient towards London.

The material through which the cutting passes consists of London clay, and it was found necessary to adopt slopes of 3 to 1. In order to avoid the acquisition of the very large quantity of land and property which would have otherwise been required, it was decided to construct retaining walls for a considerable portion of the length of the cutting alongside the railway formation in the lower part of the cutting; above the walls the cutting was formed with slopes of 3 to 1. A retaining wall was built on the up side the whole distance between the two public road bridges, a length of about 1,600 ft., and on the down side for a portion of the distance only.

On the up side the wall has a maximum height of about 31 ft. above formation level and in the highest part a thickness of 14 ft. 7½ in. at formation level. It was built in cement concrete faced with brickwork, the back of the wall being vertical and the face built on a batter of 1 in 8. The wall on the down side was of smaller dimensions. Until the recent slip occurred no trouble whatever had been experienced with the wall since its construction in 1905, no sign of any movement or crack having been detected. Several years ago slight surface slips occurred in the slope of the cutting above the top of the retaining wall. The slipping material was removed and a system of rubble drains laid in the slope with a view to strengthening it and draining it, and from that time until February, 1918, no further trouble was experienced.

The first indication that any movement was taking place in the wall was obtained from a report from the Permanent Way Inspector in February last year that the up slow line alongside the wall was lifting. An examination of the wall was at once made, and a series of measurements taken, from which it was found that a slight forward movement of a portion of the wall was taking place. It was, however, soon found impossible to keep the up slow line in anything like level, and traffic had to be stopped on that road. At the same time cracks began to appear in the ground some 10 ft. outside the top of the cutting slope, from which it was evident that a movement of a serious nature was threatened. It was also noticed that a number of the short timber struts which existed between the face of the wall and the small ballast wall forming the drain at the top of the wall were undergoing very severe compression.

The wall was kept under close observation, and arrangements were at once considered for stopping the traffic if necessary; during the evening of February 18, four days after the first indication of a movement, the wall for a length of 200 yards moved bodily forward through a maximum distance of 20 ft. at the centre, the ends remaining in their original positions. The ground at the top of the cutting slope where the crack had been noticed sank some 15 ft., leaving in places nearly a vertical face.

The whole movement took place in a few minutes, and was accompanied by loud reports as the wall cracked at each end and at the point of maximum movement. As all four lines were damaged traffic on the railway was for some time suspended, but arrangements were at once put into operation whereby traffic to and from the north was diverted into Paddington Station, and a service between Wembley Hill Station and Marylebone was also at the same time maintained.

No further movement occurred in the wall, and steps were at once taken to secure the safety of that portion of the wall not affected by the slip and also to reopen the line for traffic at the earliest possible moment. Very strong timber struts were put across under the permanent way between the retaining wall and the wing

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wall of the bridge at Park Lane, and raking struts from these to the wall to ensure the safety of that portion of the wall in front of Cumberland House. This proved effective, no movement taking place at this point. Arrangements were also made with Messrs. Scott and Middleton, contractors, and work commenced as quickly as possible on eight 6 by 5 ft. concrete struts and a 20 by 20 by 10 ft. deep concrete block, with a view to preventing any movement in the portion of the retaining wall between the east end of the slip and Wembley Hill Road, which had so far not been affected. A concrete cross strut has also been laid near Park Lane Bridge in place of the temporary timber one above mentioned. This work has so far proved effective in checking any movement in the remainder of the wall.

Meanwhile work was proceeding in connection with the permanent way. It was decided to lay in two lines for up and down traffic round the site of the slip, lifting and extending the formation out on to the slope of the cutting opposite the slip as found necessary. This entailed considerable work in the way of filling, but good progress was made, and in seven days' time up and down traffic was again resumed, and has since proceeded without interruption; this work was done by the railway's own men.

It having been decided that the obstruction should be completely removed and four lines of way again provided as soon as possible, arrangements were made accordingly for dealing with the slip and reconstructing the retaining wall.

With a view, therefore, to finding out what had actually occurred and where the sliding bed was, and also to break up the slip and relieve the earth pressure, it was decided to sink down behind the old wall and put in 11 concrete counterforts. These counterforts, spaced 60 ft. apart, are 30 ft. long measured from the face of the wall in its original position back into the slip, 12 ft. wide and varying in depth according to the height of the proposed new wall, and the nature of the material met with in the foundations.

The counterforts and new wall are being built in cement concrete, vertical at the back, and with a battered face of 1 in 8 to suit the existing wall. Where the existing wall fouls the line of the new wall at each end of the slip the new work will be left with a rough stepped face to enable the finished face of the wall to be securely bonded in when the old wall is cleared away. Old rails will be built into the new wall tying it into the counterfort, and, as an additional safeguard, the counterfort is built in the form of a dove-tail in front to receive the retaining wall on each side of it. Drains are being placed through the counterforts leading from the slipping surfaces at the back of the counterfort to the front of the wall and thence to the drain under the railway formation.

The new wall is some 7 ft. less in height than the old one, and the slope of the cutting above the new wall is being trimmed to slopes of 4 to 1 and 3 to 1. To effect this about 35,000 cubic yards of material have been removed, exclusive of the excavation in the counterforts and new wall. This, together with 15,000 yards from the excavations for the counterforts, new wall, struts, &c., totals some 50,000 cubic yards, which is being conveyed to a tip situate on the down side of the line about $\frac{1}{4}$ mile beyond the western end of the cutting. The total quantity of concrete in the new wall, counterforts and struts, is approximately 11,000 cubic yards. On completion of the new wall the old wall and *debris* in front will be cleared way to formation level, and the four lines of way reinstated in their original position.

The work is being carried out to the designs of and under the supervision of the Great Central Railway Chief Engineer, Mr. H. Blundell, M.Inst.C.E., and the immediate superintendence of Mr. S. L. Murgatroyd, M.Inst.C.E., Permanent Way Engineer.

The great landslide which occurred during the night of December 19, 1915 in the Warren at Folkestone, and which entirely blocked railway communication between Dover and Folkestone, South Eastern and Chatham Railway, was of an entirely different character, and was probably unparalleled in magnitude in the history of railways in this country.

A few days previous to the landslide, which occurred at about 6.50 p.m. on the evening of December 19, 1915, there had been a slight slip in one of the cuttings in the Warren, but nothing of an unusual nature had occurred. There had been exceptional rainfall for some time, and it was

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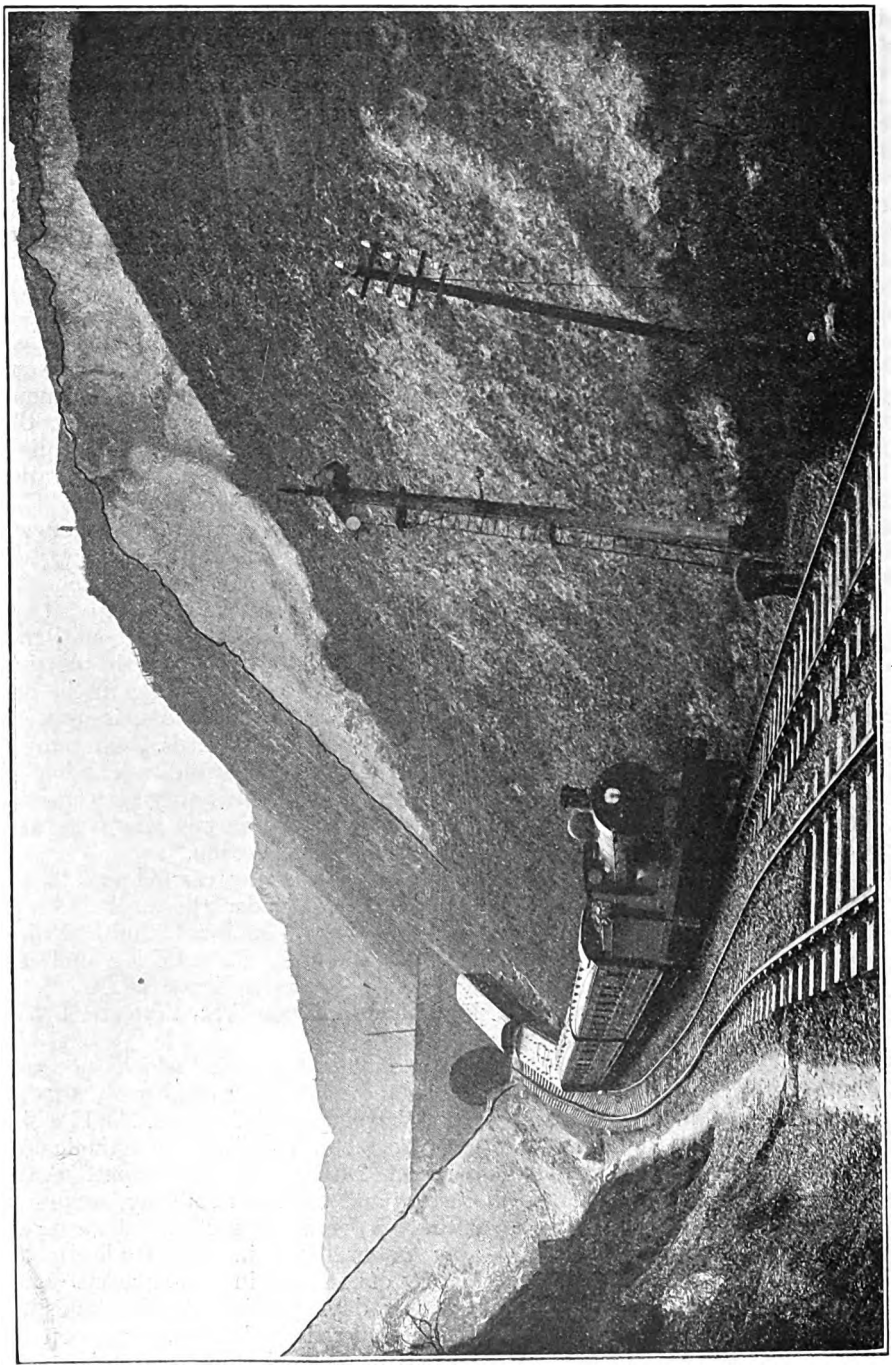

THE GREAT LANDSLIDE: SOUTH EASTERN & CHATHAM RAILWAY.
Commencement of Slip. East End of Martello Tunnel. The line of cleavage on both sides of the railway is accentuated by the black line.

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thought that the slip referred to was probably due to this fact, but nevertheless a very sharp watch was kept and other precautions taken. At the time mentioned one of the watchmen who was stationed near the Folkestone end of the Warren, heard a noise of a fall of chalk just after a train had started from Folkestone Junction in the direction of Dover, and he stopped the train as it was emerging from the Martello Tunnel. By this time the permanent way was subsiding very gradually, and the train was not able to get back, but the passengers alighted therefrom and walked back to Folkestone through the tunnel, and no one was injured. The subsidence of the ground continued, with the result that the train was finally left in the position shown in one of the photographs, but no damage of any consequence was done to the rolling-stock or engine, which were removed a few days later.

The length of the railway affected by this slip extended from a crack situated 180 yards in from the Dover end of Martello Tunnel to a set in the talus of the cliffs which dies out 287 yards from the Folkestone face of Abbotscliff Tunnel, and comprises a length of 2 miles. The more serious movement extended from the Dover face of Martello Tunnel to within 560 yards of the Folkestone face of Abbotscliff Tunnel, a length of 1 mile 715 yards and in width it covered the area between the face of the high cliffs, and extended seawards about 250 yards beyond low-water mark. The maximum width affected is 760 yards or $\frac{7}{16}$ of a mile; this occurred in the vicinity of Warren Halt, which had been pushed bodily 53 yards towards the sea. The area of the serious movement comprised about 155 acres.

Parliamentary powers were obtained for the construction of the railway through the Warren in the year 1836. The work was carried out by Mr. William Cubitt, engineer, and the line was opened for traffic in the year 1844. From the time the line was made to the present day the sea has steadily encroached, except where in recent years defence works have been erected and the foreshore properly beached, and also a considerable number of drainage headings for the purpose of dealing with land water were made. These have been damaged or destroyed and carried seawards by the recent movement which took place much below their level. Since the year 1851 the sea has encroached in some places as much as 90 yards.

The causes of the landslide are intimately associated with the geological character of the district, and none of the usual remedial measures are applicable, or if practicable, would be enormously expensive.

A temporary connection between Folkestone and Dover over the site of the slip will be opened in the course of a few months but it is not intended to reinstate the railway permanently on this route on account of the nature of the ground.

The following is a list of recorded landslides in the Warren :—

1765.—Great fall near Steady Hole.

1800.—A slip occurred in the Warren.

1839.—December. A slip in the Warren about the same time as the great landslide at Lyme Regis.

1877.—January and February. East end of Martello Tunnel, about 100 acres in extent; two days after a slip occurred at the east end of the Warren.

1881.—March. Slip in Warren.

1885.—September. A fall of chalk near Capel Lodge blocked the railway cutting.

1886. January. West end of Warren area affected about 1 mile in length.

1892.—November. Slip near the Warren Inn, which carried down the road about 40 ft.

1896.—December. Extensive slip west end of the Warren, and effects extended as far as Abbotscliff.

1915.—December. Landslide in the Warren extneding from Martello to nearly the west end of Abbotscliff Tunnel, and covering a width of nearly $\frac{1}{2}$ mile; numerous islands were formed up in the bay. This is the greatest disturbance ever recorded. From the above list it will be seen that there is no regular interval between the movements. The 1877 landslip is noticeable, as it comprised two distinct phases, the first being a movement near the Martello Tunnel, by which part of the east end of the tunnel was destroyed; while the second phase, two days afterwards, was responsible for a large fall of chalk from the high cliff between Capel Lodge and Abbotscliff House. The latter completely blocked the cutting to a depth of from 50 to 60 ft.

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The cliffs from the Folkestone end of Abbotscliff Tunnel to Dover are continually breaking away and falling into the sea, but from entirely different causes to those at work in the Warren. In the last few years the appearance of these cliffs has altered considerably, especially Shakespeare Cliff, which has slipped away rather rapidly, and has lost its old familiar contour.

We are indebted to Mr. P. C. Tempest, M.Inst.C.E., Chief Engineer, and to Sir Francis H. Dent, General Manager, South Eastern and Chatham Railway, for particulars and illustrations utilised with this article.

SIR ALBERT STANLEY, M.P., AND THE BOARD OF TRADE.

In the RAILWAY MAGAZINE for January, 1917, we announced that Sir Albert Stanley, the Managing Director of the Underground Electric Railways Company of London, Limited, and of associated transport undertakings, had been appointed President of the Board of Trade. He has since held that position with honour and distinction, but latterly failing health has caused his duties to be temporarily deputed to Sir Auckland Geddes. He has now retired from the Government and will resume his associations with the underground companies after recuperating his health by a trip to America, taking, however, the position of chairman; Lord George Hamilton having resigned. Sir Albert Stanley was born at Derby in 1875. Early in life he went to America, was educated in technical schools there, and, taking up railway work, secured rapid promotion, with the result that before he was 30 he was General Superintendent of the Detroit United Railway. He afterwards became General Manager of the Public Service Corporation of New Jersey. In 1907 he returned to England to be General Manager of the District Railway, and the Bakerloo, Hampstead and Piccadilly Tubes. Later full executive control of all the railways and associated transport agencies operated by the Underground Electric Railways Company of London, Limited, was vested in him. He retained the position of managing director until his appointment as President of the Board of Trade in 1916. He received the honour of knighthood in 1914.

Topical.]

THE RIGHT HON. SIR ALBERT STANLEY, M.P., Chairman, Underground Railways Company of London, Ltd.

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Some Armistice Notes on French and Belgian Railways.

By VERNON SOMMERFIELD.

THANKS to facilities recently accorded by the Ministry of Munitions and the British military authorities, the writer has been enabled to glean a considerable amount of information relative to the operation and condition of the railways of Belgium and Northern France during the Armistice period, and the following notes have been compiled in the belief that they may be of interest to readers of THE RAILWAY MAGAZINE.

Permanent Way and Stations :—These have been extensively and intensively damaged, the amount of the destruction being far greater than the average newspaper reader can imagine. Station buildings have been wrecked or burned, signals and signal boxes irretrievably damaged ; bridges blown up wholesale, so that a large proportion of traffic is compelled to proceed dead slow over temporary structures ; and rails have been dynamited at the joints or otherwise rendered useless. Much of this destruction is, of course, due to the ordinary processes of war, and some of it, such as the damage to the station and yard at Valenciennes, has been inflicted by our own explosives ; but a considerable amount is wanton, and was effected by the Germans out of the malicious desire to destroy as much property as possible during the period immediately prior to the signing of the Armistice. This is especially noticeable in regard to the bridges on the main routes between France and Belgium, as well as the Belgian National Light Railways system, whose condition is referred to later. Incidental damage to railway tracks and other works has also resulted from the explosion by the Germans of their own ammunition trains to prevent the contents falling into the hands of the Allies, but lack of time fortunately prevented much of this particular form of destruction from being carried out, although one comes across some spectacular instances, such as at Fleurus, near Namur, where the station approaches were at the end of April still littered with the wreckage of some half-dozen shattered trains.

Locomotives and Rolling-Stock :—Throughout France and Belgium one remarks an unusually high percentage of German goods vehicles, most of which have been handed over under the Armistice terms. Throughout a fairly considerable journey the bulk of the goods stock observed, both in the sidings and actually working, is often German. German locomotives and passenger vehicles are also common, but not to anything like the same relative extent as goods stock. On the other hand, not so much French and Belgian working stock is visible as under normal conditions. On the publication of the Armistice terms it was calculated by the writer that the railway stock which Germany was obliged to hand over to the Allies was only about equal to that which the enemy had seized in Belgium and Northern France (and to a large extent utilised in other theatres of war), and observations on the spot would seem to bear out the correctness of this estimate.

The bulk of the German locomotives so far handed over are of the heavy goods type. The passenger vehicles are of all descriptions, from the oldest type of third-class carriage to the most up-to-date corridor stock built for express working. The Prussian eagle appearing on the sides of these latter vehicles has been overpainted by a conspicuous St. Andrew's cross in white. It may also be mentioned that a considerable proportion of the Belgian rolling-stock still bears the special distinguishing marks adopted by the German military authorities. The bulk of the German locomotives, it should be added, appear externally in quite as good a condition as the average French or Belgian locomotive under present conditions ; but the writer was unable to gather the extent to which the substitution of other metals than copper for boiler tubes and fireboxes, and the general maintenance difficulties alleged to have been experienced in the

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Central Empires during the war may have impaired the operating efficiency of the German machines.

Light Railways :—The Belgian National Light Railways system (*Chemins de fer vicinaux*) comprise, as is generally known, a network which in point of track mileage was, in 1914, about to surpass that of the main lines. This is due to the fact that practically no extensions had been carried out on the State railways from about 1883 until the beginning of the war, during which period the light railways had been developed until their feeder lines covered practically every part of the country where traffic conditions did not warrant the expenditure that would have been involved by the construction of a standard-gauge heavy line, with its own "right of way" and expensive stations and signalling appliances. During the war various details were published regarding the German treatment of this light railway network, and it was common knowledge that many tracks had been taken up and carried away, together with their locomotives and rolling-stock, for use elsewhere. This appears to have been done both on certain sections of the Western Front and in Poland, and was an act which can be justified as legitimately due to military necessities or requirements. But the Boche has also been guilty of very much wanton and malicious damage, which is particularly noticeable in the neighbourhood of the French frontier. Here one comes across sections of light railway where for miles on end every rail length and every locomotive and vehicle have been removed, although the ballasting and the overhead wires still show the route. Elsewhere, miles and miles of track have been destroyed by the skilful dynamiting of every rail joint, or else one set of rails has been damaged for miles while the other (single tracks are the rule on these lines) has been left more or less intact. The nature of all these different kinds of destruction shows it to have been done deliberately and in thoroughly organised fashion by trained experts; every mile bears evidence of the fact that this is no case of damage inflicted

Photo.] [*Sergt. Mead.*

EXTERIOR OF COLOGNE STATION.

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for purely military reasons, such as delaying the advance of a pursuing enemy, since a hundredth part of the destruction actually carried out would have sufficed for such legitimate purposes. It is also notable that along all these lines a clean sweep has been made of locomotives and rolling stock, and the very few vehicles which one occasionally comes across are all damaged and generally overturned across the remnants of the track. The Belgian Light Railways certainly do not represent the smallest item in Germany's war bill.

This applies not only to light railways laid in districts where there is no commercial justification for their retention and where their presence may hamper agricultural operations, but also to standard gauge lines. For instance, the British Army doubled one section of line in order to accommodate the very heavy military traffic during the war, but as a quadruple track is not considered necessary under normal conditions the two additional roads have already been removed. An Inter-Allied Commission, with plenary

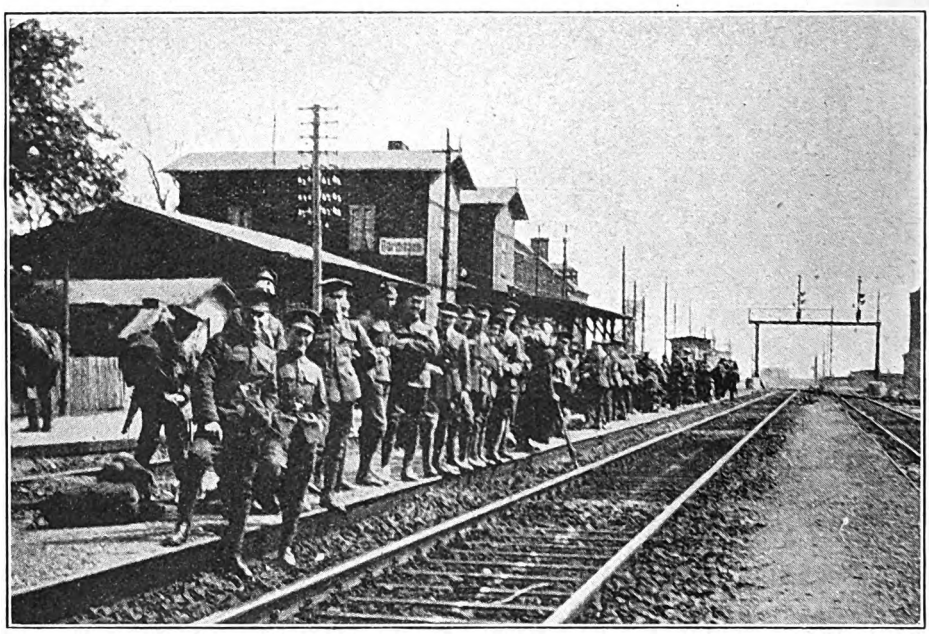

Photo.] [*Sergt. Mead.*

MEN OF THE 13th BATT. K.R.R.C. WAITING AT DORMAGEN STATION FOR A TRAIN TO COLOGNE.

Military Lines:—At the moment of writing considerable uncertainty still remains as to the future of the hundreds of miles of light and heavy railways laid down in France by the British and American armies for military purposes. It had at one time been intended that France should retain as a free gift such of these works as she required, and no doubt advantage will be taken of this offer so far as concerns some of the larger dock and harbour works, &c., executed by the Americans. But a large percentage of the military railway mileage is not required by the French Government as a permanency. powers, is now examining the whole question of railways built for military traffic, and such lines as are not required will be taken up and the trackwork and equipment sold by auction.

Military Railway Traffic:—The bulk of the troop trains running in France and Belgium are still made up of goods vehicles, although considerable improvements have been effected in the working of this traffic since the signing of the Armistice. Covered vans are employed, with facilities for heating and the preparation of meals, &c., while special attention has also been paid to the provision of hot water and meals at

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various stations *en route*. The speed of the troop trains, due to the physical condition of the lines and other causes, is still intolerably slow, being below that of an average English goods train. In striking contrast, as regards both speed and comfort, is the "Cologne Express," which now runs daily in each direction between Boulogne and Cologne for the benefit of officers attached to the Army of Occupation, and proceeding on or returning from leave, &c. The working of this train is entirely under military control, and special paper tickets, issued by the military authorities, are issued to passengers. The Cologne Express is strictly "limited," only a definite allotment of tickets being issued daily, and is in each direction in charge of an officer, while all the train staff are also in military uniform. Meals and light refreshments are procurable at very reasonable prices.

The make-up of the Cologne Express, except for the locomotive, is English, and varies from 15 to 17 coaches. On the occasion of the writer's journey it was composed of 13 South Western ambulance coaches, and a Brighton and Great-Eastern mail van. Some of the ambulance coaches were of the separate berth variety, but the bulk are open cars, with 36 berths arranged in tiers of 3, 18 on each side of the vehicle. These berths are constructed to enable any not in use to be folded back by the manipulation of swinging brackets, thus providing more air space by night and greater comfort by day if any are unoccupied. Portable folding tables are provided for the service of meals.

Appended is the time-table which has been in force since April 4. The condition of the tracks and the existence of a large number of temporary bridges preclude high speed, but the time-table is now being adhered to with reasonable punctuality. The discrepancy in the up and down timings between Boulogne and Outreau is accounted for by the very early arrival at Outreau on the journey from Boulogne, and the train is therefore held at Outreau so as to avoid the necessity of passengers getting up in the small hours.

Down.	Arr.	Dep.
Boulogne (Maritime) ..	——	10.14 p.m.
Boulogne (G.C.) ..	10.19 p.m.	10.20 p.m.
Outreau		10.26 p.m.
Etaples	11.2 p.m.	11.4 p.m.
Montreuil	11.22 p.m.	11.27 p.m.
St. Pol	12.41 a.m.	12.46 a.m.
Arras	1.42 a.m.	1.52 a.m.
Somain	3.4 a.m.	3.14 a.m.
Raismes	3.42 a.m.	3.43 a.m.
Blanc-Misseron ..	4.21 a.m.	4.23 a.m.
Quievrain	4.28 a.m.	5.5 a.m.
Mons	5.45 a.m.	5.53 a.m.
Charleroi	7.25 a.m.	8.30 a.m.
Namur	9.30 a.m.	9.40 a.m.
Andenne	10.11 a.m.	10.14 a.m.
Huy	10.32 a.m.	10.37 a.m.
Seraing	11.15 a.m.	11.20 a.m.
Kinkempois	11.30 a.m.	11.35 a.m.
Pepinster	12.10 a.m.	12.15 p.m.
Welkenraedt	12.45 p.m.	12.47 p.m.
Werbesthal	12.50 p.m.	1.36 p.m
Aix-la-Chapelle ..	2.1 p.m.	2.2 p.m.
Düren	3.18 p.m.	3.28 p.m.
Cologne	5 p.m	—

Up.		
Cologne	—	9.50 a.m.
Düren	10.51 a.m.	11.1 a.m.
Aix-la-Chapelle ..	11.48 a.m.	11.53 a.m.
Herbestahl	12.24 p.m.	12.30 p.m.
Welkenraedt	12.33 p.m.	12.50 p.m.
Pepinster	1.20 p.m.	1.25 p.m.
Kinkempois	2.1. p.m.	2.15 p.m.
Seraing	2.25 p.m.	2.30 p.m.
Huy	3.8 p.m.	3.13 p.m.
Andenne	3.31 p.m.	3.34 p.m.
Namur	4.5 p.m.	4.15 p.m.
Charleroi	5.15 p.m.	6.18 p.m.
Mons	7.43 p.m.	7.53 p.m.
Quievrain	8.33 p.m.	8.35 p.m.
Blanc-Misseron ..	8.42 p.m.	9.0 p.m.
Raismes	9.38 p.m.	9.39 p.m.
Somain	10.7 p.m.	10.17 p.m.
Arras	11.29 p.m.	11.39 p.m.
St. Pol	12.33 a.m.	12 38 a.m.
Montreuil	1.52 a.m.	1.57 a.m.
Etaples	2.15 a.m.	2.17 a.m.
Outreau	2.53 a.m.	7.24 a.m.
Boulogne (G.C.) ..	7.30 a.m.	—

The best connection on the English side is given by the "Staff train" which runs between Victoria and Folkestone, over the old Chatham and Dover route *via* Otford, Malling, and Maidstone East, and is mainly composed of Pullmans. The precise reason why a stop of some five hours at Boulogne should be necessitated on the outward journey is, however, one of those things "no fellah can understand."

[*Illustrations here given, while not strictly pertinent to Mr. Sommerfield's article, are noteworthy in that they relate to the progress of the "Army of the Rhine" to Cologne. The photographs, supplied by Lt. H. W. Taylor, were taken by Sergt. Mead, 13th Batt. K.R.R.C.* Ed. "*R.M.*"]

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Locomotive and Train Working in the latter part of the 19th Century.

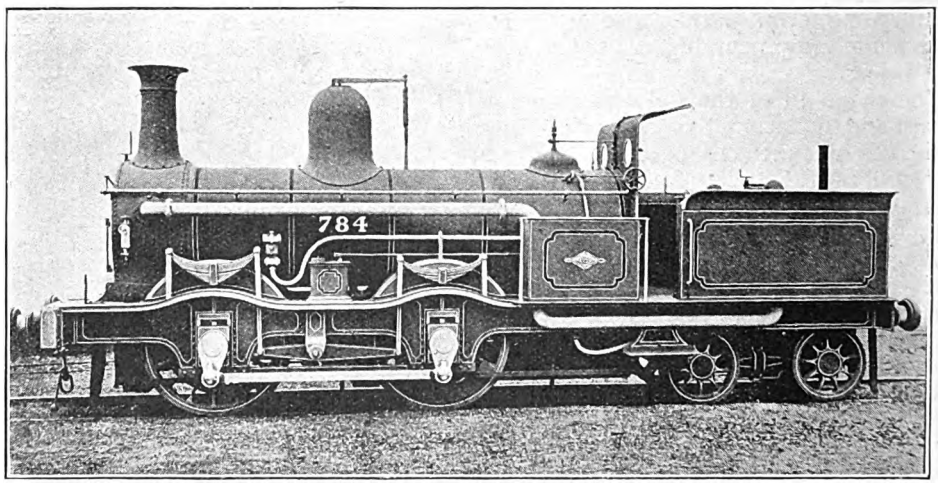
MIDLAND RAILWAY. [No. III.]

(*Continued from* RAILWAY MAGAZINE, *Volume XLIV, page* 396.)

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

WITH the "1070" class the account of the principal tender passenger engines running at the end of 1875 is complete. The number of tank engines employed upon passenger traffic was only about three dozen, of which nearly all were stationed at Kentish Town for the Metropolitan local services between Hendon and South Tottenham and Moorgate Street.

The earliest 2-4-0 side tank engines, Nos. 230 to 239, subsequently converted to tender engines, have already been mentioned. Owing to their unsuitability the Midland purchased six 4-4-0 tank engines of the Metropolitan Railway standard type then (1868) being constructed by Beyer, Peacock and Co. These became Midland Nos. 204 to 209. Following them the same builders constructed in 1869 Nos. 690 to 695, 0-4-4 back tank engines with outside frames. These, like all other Beyer, Peacock's engines on the Midland, had this firm's standard copper-capped chimneys. The coupled wheels, had a diameter of 5 ft. 2½ in., and the cylinders were 17 in. by 24 in. For a long time they worked a local service of trains from St. Pancras to Earl's Court *via* Cricklewood and Turnham Green.



0-4-4 TANK ENGINE No. 784 (SERIES 780-799).
Designed by Mr. M. Kirtley and built by Dübs & Co. in 1870. Coupled wheels, 5 ft. 2½ in. Cylinders, 17 in. by 24 in.
These condensing tank engines have worked in the London district ever since they were built.

Twenty somewhat similar engines, Nos. 780 to 799, were built by Messrs. Dübs and Co. in 1870. These, together with 204 to 209, worked the Moorgate Street services, and also the Midland trains to Victoria (London Chatham and Dover Railway) *via* Ludgate Hill. The Metropolitan 4-4-0 engines 204 to 209 have been broken up some years ago, but the twenty-six 0-4-4 tank engines, now Nos. 1200 to

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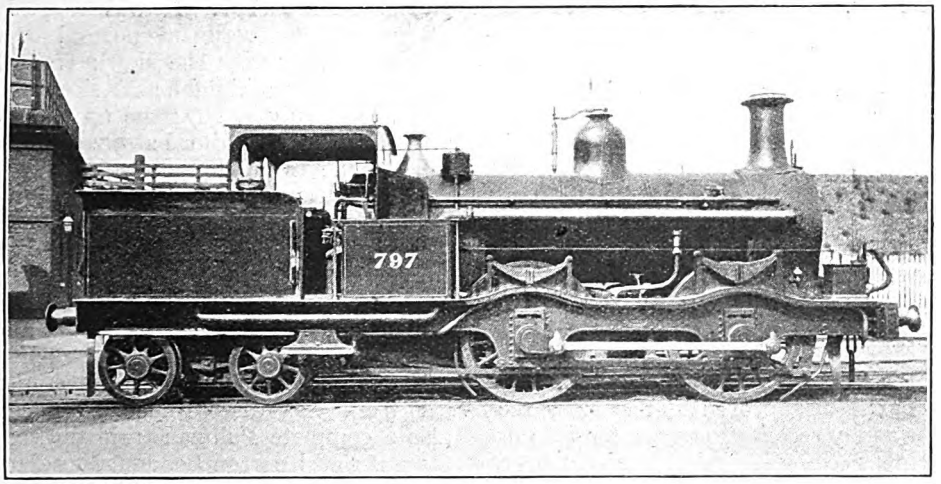

Photo.] [*Loco. Publishing Co., Ltd.*

0-4-4 TANK ENGINE No. 797 (SERIES 780-799).
As rebuilt by Mr. S. W. Johnson, 1888-1893.

1225, are still to be seen regularly at work in the London district.

Of other passenger tank engines there were only some half-a-dozen, all nondescripts which had been derived from various sources. Of these one outside-cylinder 2-4-0 tank engine, No. 203, by Messrs. Stephenson and Co., worked a St. Pancras–Birmingham through carriage round the south curve at Wigston Junction, between Wigston Station (L. & H.) and Glen Parva junction. Three other interesting 0-4-2 tank engines owed their origin to the "Little" North Western Railway, as the Skipton to Lancaster line used to be called. They were rebuilds of old "single" engines built by Messrs. Fairbairn, and had 5 ft. coupled wheels, and 12 in. by 18 in. cylinders. Of these, after 1878, No. 200A worked the Midland coaches at Hereford between Barr's Court Junction and Barton Station; 201 succeeded the previously mentioned outside-cylinder tank engine (No. 203) at Wigston, and 202 I remember in 1885 to 1887 working the Midland local passenger service from Cricklewood to Gunnersbury.

The goods engines built until the end of 1874 were entirely of the double-framed pattern with 5 ft. 2 in. wheels, and cylinders varying from 16 in. and 16½ in. to 17 in. diameter by 24 in. stroke. One of the earlier ones, No. 291, is illustrated, as also No. 839 of the 17 in. by 24 in. design built in 1870. One of the latter class, No. 920, at that time quartered at Wellingboro' was working a fast goods train from Manchester, and when in the middle of Doves Holes tunnel at the top of the 1 in 90 bank near Peak Forest, the blast blew away the bell top of the chimney. However the engine managed to get through the remainder of the journey home with a truncated headpiece, in spite of which, contrary to what one would surmise, "it got on remarkably well considering," as the driver told me.

Nearly all the shunting work in sidings and yards was done by tender engines. There were only some 36 goods tank and shunting engines on the line. Of these 10 goods tank engines, Nos. 880 to 889, were used exclusively in the London district for local goods trains to the East End goods stations, and were provided with short chimneys in order to pass through the tunnels. These have 4 ft. 2 in. wheels and 17 in. by 24 in. cylinders, and are still at work. For many years they had Beyer Peacock's copper-topped chimneys.

Having given a condensed review of the locomotive stock as it existed in 1874-5, few words may be added about the carriage stock. A large number of carriages, as on all other railways, were four-wheeled, and this type had been constructed until 1874. The last of these were 29 ft. long

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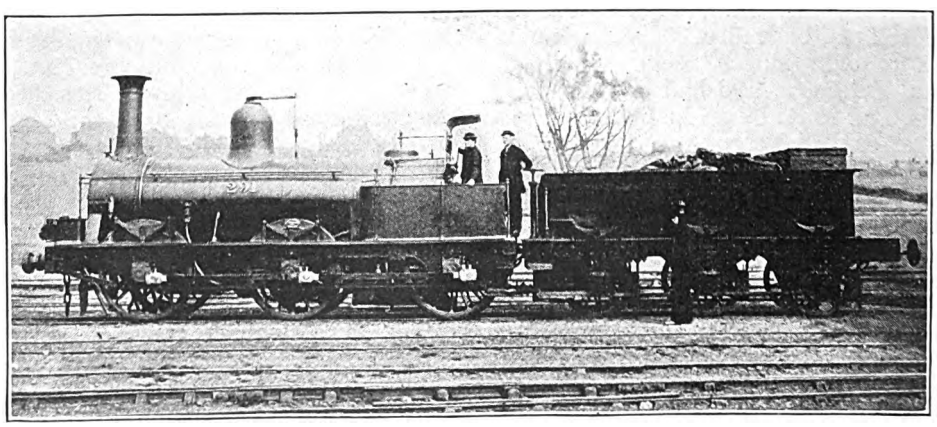
with 19 ft. wheel base, and weighed 10¼ tons. There were a number of six-wheeled coaches—chiefly first class—constructed about this period. There was also one isolated four-wheeled first-class coach which I remember very well, the only railway carriage in this country which was to my knowledge built in Germany. The maker's plate on it showed that it came from a firm in Nuremberg, and during a long period of its existence it was painted dark green, but it had the Midland lettering and coat of arms on the panels. I frequently used to see it on the local trains between Bradford, Leeds, and Skipton, but it disappeared shortly after 1885 as far as my recollection goes, for I do not remember seeing it again after that year.

In 1875 the Midland created great consternation in the railway world by abolishing second-class carriages. That their early move in this direction was the right one has since been proved by the gradual extinction of the second-class on nearly all the other principal railways, even the conservative Great Western having tardily followed suit more than 30 years later.

But the year 1875 also saw the first introduction of bogie carriages, following the Pullman cars of 1874. The latter were imported from America, and in their earliest days formed a complete Pullman train that worked from Bradford to St. Pancras and back. From June 1, 1874 the up Pullman train left Bradford at 8.30 a.m., and ran *via* Derby. It was worked to St. Pancras by a Derby engine, and arrived there at 2.5 p.m. The down train left St. Pancras at midnight as a sleeping car train. On July 1, 1874 the up train was altered to leave Bradford at 9.20 a.m., and ran *via* the Erewash Valley line, arriving at St. Pancras at 2.35 p.m. The following month the Chesterfield and Trent stops were cut out, and the train was due at St. Pancras at 2.15 p.m.; but in September 1875 the Trent stop was again inserted and the arrival at St. Pancras became 2.20 p.m. It ran on this schedule until April 30, 1876, when the complete car train was discontinued. There was also a complete Pullman train during the same period between London, Manchester, and Liverpool. The drawing room and the sleeping cars were then the property of the Pullman Company, and were all named, and an extra first class fare was charged, but the ordinary first and third class cars were the property of the Midland.

In 1876 the Pullman trains were separated into their component cars, which were placed in the Scotch expresses between St. Pancras, Edinburgh, and Glasgow, and some also worked between London, Manchester, and Liverpool. In later years the Midland bought up the Pullman Company's cars, numbered them with their own coaching stock, and they lasted on the main line expresses until about the end of the century, when they were mostly converted into saloons for the use of football



No. 291, STANDARD GOODS ENGINE OF PERIOD 1858-1863.
Designed by Mr. M. Kirtley and built at Derby, 1861.
Wheels, 5 ft. 2½ in. Cylinders, 16 in. by 24 in.

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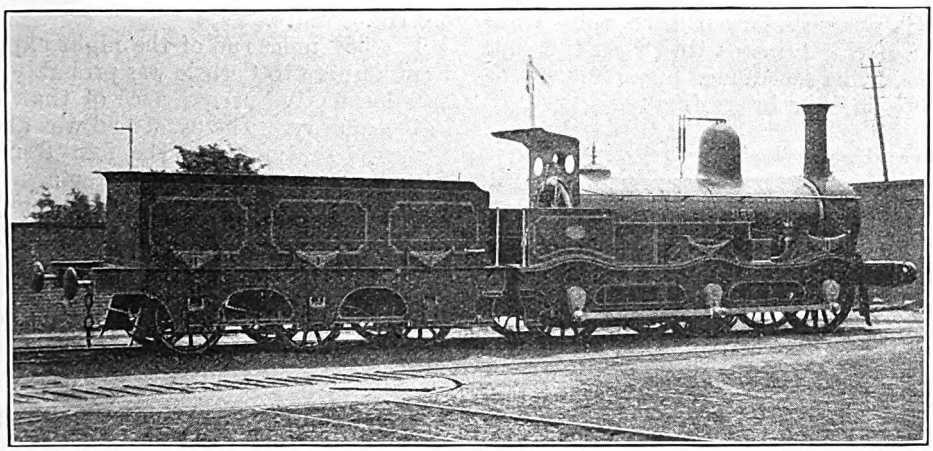
teams. Some of the car bodies may now be seen on sidings at Nottingham, Derby, and elsewhere, serving as tool sheds and shelters.

At the same time the Midland had built in this country about 40 or 50 12-wheeled clerestory-roofed bogie carriages divided into first and third class compartments. These were the first British-built bogie carriages to work in this country; they were 54 ft. long, with a total wheel base of 46 ft. 6 in., and weighed 22½ tons empty. In 1877–8 a number of somewhat similar third composite brakes were built at Derby with four wheeled bogies at each end.

The present red colour of the Midland carriages dates back prior to my earliest recollections, but there were still in 1874–5 a few of the older third class carriages in use which were painted a dark green colour, and used chiefly for workmen's trains.

Main line train services in 1875, and, in fact, until 1880, when some marked improvements took place, differed in many respects from those of to-day. Those starting from St. Pancras consisted of the Leeds, Bradford, and Scotch services, and the Manchester trains. With regard to the former the Midland relied upon obtaining inter-station traffic rather than through London to Leeds and Bradford passengers, for the Yorkshire connection to London of their Great Northern rivals was too well established to be easily shaken, and, moreover, the Great Northern Leeds-London expresses were certainly in those days run at higher speeds. The Midland, therefore, apparently contented itself with supplying the needs of Bedford, Leicester, Nottingham, and Sheffield. The one bid which they made in 1874–6 for through Yorkshire-London traffic was that of the through up and down Pullman expresses.

As far as Scotch traffic was concerned the Midland suffered a severe handicap in that on reaching Ingleton its trains were handed over to the London and North Western, which forwarded them to Carlisle *via* Tebay and Penrith. A more modern view of Clapham Junction (Yorkshire) Station is reproduced. The straight road to the right goes to Ingleton, and that to the left to Lancaster and Carnforth.



No. 839, MR. KIRTLEY'S STANDARD GOODS CLASS OF 1869-1873.
Built by the Vulcan Foundry Co., 1870. Wheels, 5 ft. 2½ in. Cylinders, 17 in. by 24 in. Steam pressure, 140 lb.

Nottingham, one of the most important Midland centres, was also a difficulty, for it was situated on a branch line from Trent to Lincoln, without any facilities for through trains. Nottingham coaches from London had to be detached at Trent from the Leeds or Manchester expresses, and nearly all passengers for Nottingham from Leeds or Bradford had to change at Trent. There was, however, more of an attempt to obtain through passengers between London and Manchester, for although the London and North Western secured the lion's share of this traffic the latter company was not given to unduly hurrying

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its trains, and did not out-distance the Midland so much in point of speed as did the Great Northern to Leeds on the opposite side. Midland trains until 1881 ran from Marple, where their Liverpool portions were usually detached, to London Road (Manchester, Sheffield and Lincolnshire) station *via* Ashbury's.

The main line North-and-West service was always good and well patronized, and there was an efficient through train service between Bradford and Bristol. These trains did not pass through Birmingham, which was then on a short branch, but travelled direct from Saltley, where the Birmingham coaches from the north were detached, to Camp Hill and Worcester.

It is not necessary to give a dry catalogue of the trains as they then ran, but the following schedule of maximum speeds of 1875 may be interesting :—

Between.	Distance. Miles.	Speed. m.p.h.	Year train was put on.
London and Bedford ..	49¾	46·7	1875
Bedford and Leicester ..	49½	46·5	1875
Bedford and Wellingborough ..	15½	44·3	1868
Leicester and Loughborough ..	12½	44·1	1875
Leicester and Trent ..	20¾	44·4*	1869
Sheffield and Cudworth ..	18¾	43·3	1872
Masborough and Cudworth	13¼	44·8	1873
Sheffield and Normanton	28¾	44·3	1875
Sheffield and Leeds ..	39½	45·6	1874
Derby and Chesterfield ..	24	42·3	1874
Derby and Marple ..	48¾	41·2	1875
Derby and Burton ..	11	36·6†	1871
Leeds and Bradford ..	13¾	41·2	1870
Leeds and Skipton ..	26	40	1873

* In the period from 1864 to 1868 the maximum speed between Leicester and Trent was 46·0 m.p.h.

† For some unaccountable reason the speed between Derby and Burton had been gradually let down to the very low average here given, but in 1866-67 it had been 41·2 m.p.h.

In 1876, the first of the more modern additions was made to the Midland network of railways by the opening of the direct Settle and Carlisle line. This gave the Midland its own through route between London and Carlisle, and a new service of Scotch expresses came into being. The maximum speed from London to Bedford became 47·4 m.p.h., and from Bedford to Leicester 47·2 m.p.h. The speed of the 86¾ miles run between Skipton and Carlisle over the long banks of 1 in 100 was at first 43·9 m.p.h., but in 1877 the time was reduced to 1 hr. 55 min., a speed of 45¼ m.p.h., at which maximum it remained for ten years. Besides the London Scotch expresses an additional service was run from Leeds and Bradford to Scotland. Manchester connections *via* the Lancashire and Yorkshire Railway were at first made at Skipton, but were transferred a year or two later to Hellifield as they exist at present.

The 86¾ miles run of the night express from Skipton to Carlisle was probably the best locomotive performance of that day in the country. The usual load was about 150 tons in summer. The first 8 miles rise at about 1 in 150, and after a 5-mile fall of 1 in 200 through Hellifield there is a continuous ascent of 15 miles of 1 in 100 to Blea Moor Tunnel. After a 10-mile undulating stretch to Ais Ghyll, in which the total net rise is only an additional 40 ft., the line falls for 48 miles to Carlisle, of which the first 11 miles are at 1 in 100.

The engines employed from the Carlisle end were of the 6 ft. 6 in. 2-4-0 type, Nos. 1302 to 1311, which will be mentioned later in detail. But the rebuilt 800 class stationed at Skipton and Leeds also took a large share of the express work over the Carlisle road. The morning express which left Leeds at 10.30 a.m., and connected with the 5.15 a.m. from St. Pancras, was always worked through to Carlisle by the Leeds engines 811 to 819. They returned with the 5.45 p.m. from Carlisle, a fast Scotch train for Manchester Bradford, and Leeds, and reached the last-named place at about 8.40 p.m.

Some of the Scotch expresses were very heavy for those days. In 1879–80 the down day express frequently consisted of 2 Pullman cars, 3 12-wheeled bogie coaches, 3 8-wheeled bogie coaches, 3 6-wheeled coaches, and 2 vans with an occasional extra horse-box or van. This load was nearly always brought in to Skipton from Normanton by one engine—usually 902 or 903, and the train did not

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run into Leeds station. At Skipton the train was divided, after 1879, into Edinburgh and Glasgow portions, and additional bogie coaches from Manchester and Liverpool brought in by Lancashire and Yorkshire engines were attached. Six-wheeled coaches and vans from Leeds and Bradford for Edinburgh and Glasgow were also added at this station. The whole of the combined train would have totalled up to 280 to 300 tons, a load

bray, from which place to Manton the old Leicester and Peterborough line was used, and a new line forming the second section was constructed from Manton, skirting the foot of the Uppingham hill, and passing over the wide Welland Valley near Harringworth, joined the old main line at Glendon Junction, two miles north of Kettering. A new express service between London, Leeds, and Bradford, was inaugurated over this route. There were five trains

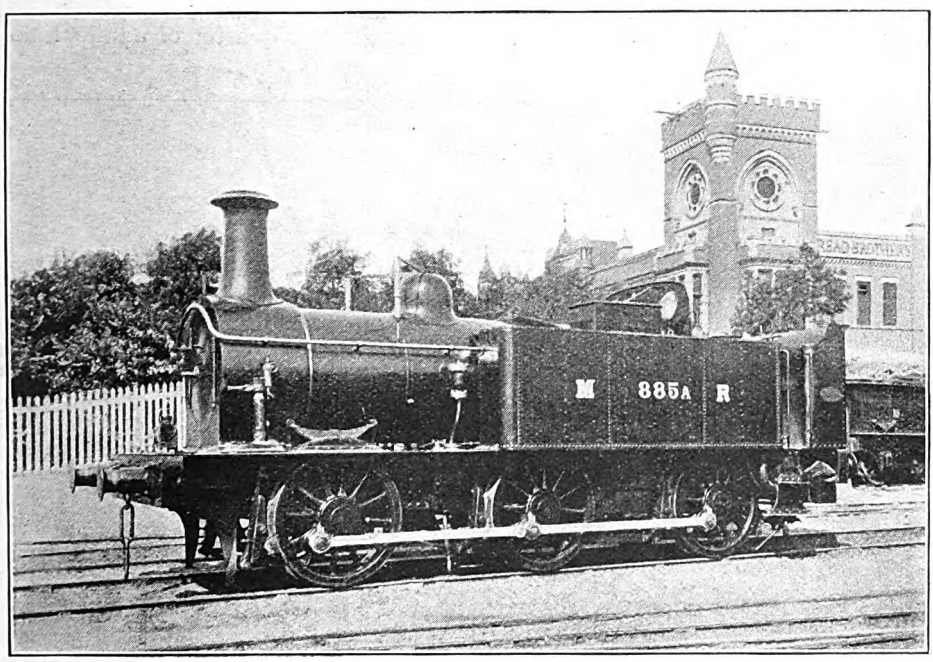

Photo.] [*Loco. Publishing Co., Ltd.*

0-6-0 TANK ENGINE No. 885A (SERIES 880-889).
Built by Beyer, Peacock & Co., 1871, for Metropolitan Goods Traffic.
Wheels, 4 ft. 2 in. Cylinders, 17 in. by 24 in. Steam pressure, 140 lb.

obviously beyond the powers of any engine of those days over the heavy Settle and Carlisle road.

Another line opened in 1880 for express traffic produced a radical improvement in the London–Leeds and Bradford services, and from this time onwards the Midland maintained a successful competition with the Great Northern, and also placed Nottingham on a main line. The new line (or lines, to be strictly accurate, for there were two independent sections) left Nottingham Station on the east side at London Road Junction for Melton Mow-

in each direction, and one additional train each way between Sheffield and London. The trains stopped at Kettering, Nottingham, and Sheffield, and one or two also halted at Chesterfield. The time allowance of nearly all of them was 4 hr. 35 min. to Leeds and 5 hr. 5 min. to Bradford. New coaches—8-wheeled bogie stock—were specially built for these trains, which consisted of four of these carriages and two 4-wheeled vans, but the clerestory roofs of 1875 were abandoned until many years later. Some of the trains were accelerated after a short time, and

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the timing of the best of them remained for some years as follows :—

Miles.				Speed.
	St. Pancras ..	dep.	10. 0	49·8
72¼	Kettering ..	arr.	11.27	
		dep.	11.31	48·5
124	Nottingham ..	arr.	12.35	
		dep.	12.41	45·0
164½	Sheffield ..	arr.	1.35	
		dep.	1.40	47·4
204	Leeds	arr.	2.30	
		dep.	2.35	41·25
217¾	Bradford ..	arr.	2.55	

The usual allowance between Leeds and Bradford was 20 minutes, but the public time-table arrival was made 3 p.m. to allow for the conditional stops at several stations between Leeds and Bradford.

The engines working these trains were all of the 6 ft. 9 in. 2-4-0 class to be described later. The London–Nottingham section was worked by Nos. 1475 to 1485 stationed at the London end, and 1400 to 1409 stationed at Nottingham. Leeds engines 1502 to 1526 worked all the trains between there and Nottingham, after Nos. 1400 to 1409 had done this work for about a year prior to their removal from Leeds. Some of the 1330 class 4-4-0 engines, occasionally worked the trains between St. Pancras and Nottingham.

It will be noticed that the distance to Nottingham is given as 124 miles instead of the 123¾ miles usually taken. The old distance has since been shortened by the making of a direct loop on the west side of Bedford Station, which avoids the latter and the severe curve through it. But further, a re-measurement of the old main line took place about 18 years ago, which mysteriously resulted in about one quarter of a mile disappearing altogether. What became of this quarter of a mile I do not know unless it found its way to the "Lost Property Office."

At one period there were two series of mile-posts on the London–Bedford section from which travellers could make their choice. At present the 123½ mile-post is on the platform of Nottingham Station, and will presumably remain there until somebody comes along and walks off with another piece of the main line. The late Mr. Rous Marten at one time got very worried over that ¼ mile, but gave it up eventually and wrote it off his notebooks as a bad debt.

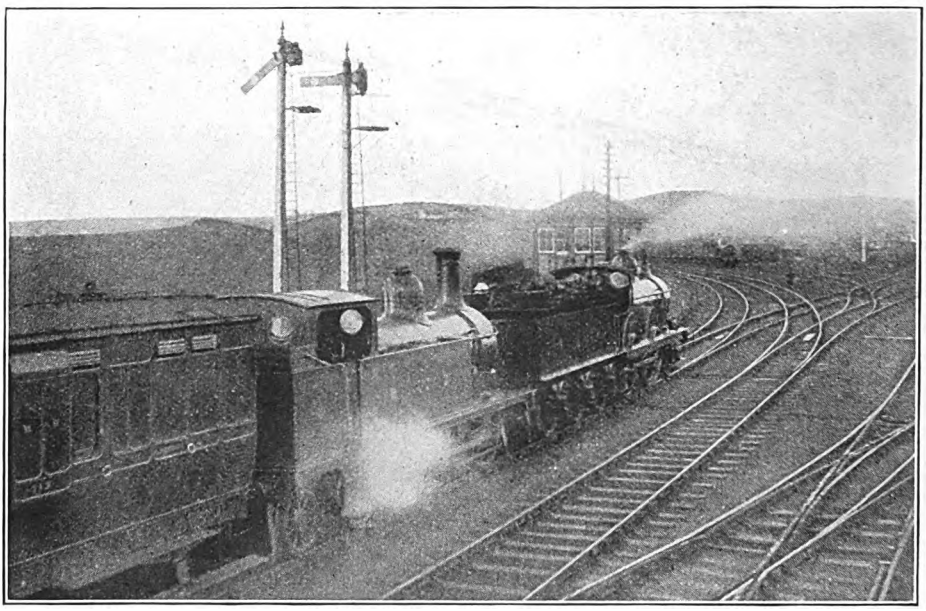

Photo.] TRAIN AT CLAPHAM JUNCTION (YORKS.) [*G. Milne.*

The Morecambe & Carnforth line diverges to the left, and the Ingleton branch to right.

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The summer of 1880 also saw another important extension in the opening of the Swinton and Knottingley joint line. Hitherto the connection with the North Eastern line had been made at Normanton and Leeds, necessitating a change of trains. By means of the new line the Midland obtained access to York, and through carriages from Newcastle to Bristol were attached to the principal Bradford–Bristol trains at Sheffield. The Midland provided about four 2-4-0 express engines and half-a-dozen goods engines to be stationed at York.

Of the new branches the most important was, perhaps, the direct line from Shipley to Guiseley, which gave a direct route between Bradford and Ilkley for residential traffic. This was opened in 1877, prior to which year the Bradford trains for Ilkley were attached in the rear of the trains to Leeds, and detached at Apperley Junction, where they stood for ten minutes or so on the main line in open country until a Leeds to Ilkley train came along and picked them up. It was a method of working which would not be allowed in these days. The chief importance of the new line lay, perhaps, in the connection which it gave between Bradford and the North Eastern Railway, for the latter company immediately instituted a passenger train service over it between Bradford and Harrogate.

Before returning to the subject of the locomotives I add another table of maximum speeds as they existed in 1881, which may be compared with the 1875 table previously given. In a few cases omitted from the new table the speeds remained as before, and in others it will be noticed that certain "decelerations" took place.

MAXIMUM SPEED IN 1880–1.

Between.	Distance. Miles.	Speed, m.p.h.	Year of new maximum.
London and Bedford ..	49¾	49·8	1881
Bedford and Leicester ..	49½	49·5	1881
London and Kettering ..	72¼	48·7	1880
		49·3	1881
Kettering and Nottingham	51¾	48·5	1880
		49·3	1881
London and Leicester ..	99¼	46·9	1880
Bedford and Wellingborough ..	15½	44·3	1880
Leicester and Trent ..	20¾	47·9	1879
		46·2	1880
Sheffield and Cudworth ..	18¾	45·0	1878
		43·3	1880
Sheffield and Normanton	28¾	46·6	1877
Sheffield and Leeds ..	39½	48·3	1880
		47·4	1881
Derby and Marple ..	48¾	43·0	1880
Skipton and Carlisle ..	86¾	45·7	1877
Hellifield and Carlisle ..	76½	44·8	1881

(To be continued.)

Locomotive and Train Working in the Latter Part of the Nineteenth Century.

Railways already dealt with in the "Railway Magazine" by Mr. E. Ahrons are:—

L. & N.W.: Jan., Feb., March, May, 1915. (All out of print.)
GREAT NORTHERN: June, July, 1915. (Both out of print.)
MANCHESTER, SHEFFIELD & LINCOLNSHIRE: Aug., Sept., Oct., 1915. (Aug. and Oct. out of print.)
GREAT WESTERN: Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916. (Dec., Jan., Feb., June, July, and Aug. out of print.)
GLASGOW & S.W.: Sept., Oct., 1916. (Sept. out of print.)
GREAT EASTERN: July, Aug., Sept., Oct., Nov., Dec., 1918. (Dec. out of print.)
NORTH EASTERN; Nov., Dec., 1916. Jan., Feb., March, April, May, 1917. (Nov., Dec., 1916, Jan. and Feb., 1917, out of print.)
SOUTH EASTERN: June, July, Aug., 1917.
LANCASHIRE AND YORKSHIRE: Sept., Oct., Nov., 1917.
LONDON, CHATHAM & DOVER: Dec., 1917. Jan., Feb., 1918.
CALEDONIAN: March, April, May, June, 1918.
LONDON BRIGHTON & SOUTH COAST: Jan., Feb., March and April, 1919. (First three out of print.)
MIDLAND: May and June, 1919. (May out of print.)

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Power Signalling as a Factor in Railway Development.

By J. F. GAIRNS.

IN the aggregate, power signalling, including automatic and semi-automatic installations, has made considerable headway on British railways, but proportionately the extent to which it has been introduced is very limited, and in no degree can its use yet be considered characteristic of British railway practice. For this there are good and sufficient reasons, and it would be grossly unfair to suggest that our home railways are unprogressive and backward in this respect. Indeed, the present situation is a tribute to British competence in the past, in that the efficiency and completeness of our manual signalling is due to the fact that the block system, and all reasonable safeguards, have been insisted upon as a standard feature of railway operation for so many years. Were it not so, our railways would not have achieved the record of safety they have realised, though a less satisfactory record would have afforded greater opportunities for modern signalling development. This has been attained, be it remembered, while operating peculiarly dense and complex traffic under all conditions, and for which no other railways in the world can produce a parallel.

It is true that complaint is frequently made, sometimes with justification, that we have carried the "safety" policy somewhat too far in insisting upon signalling completeness where a lower standard might have sufficed. Be that as it may, however, the fact remains that the chief obstacle to progress in regard to installation of power signalling equipment has been the high standard and completeness of the manual signalling provided almost everywhere, with the result that it is mainly when new lines or extensive reconstructions are undertaken, and in cases where its use becomes imperative, as on dense-traffic electric lines, that opportunity is afforded for replacing manual by power installations.

Nevertheless, power signalling is now a "proved proposition," whether electric pneumatic, or electro-pneumatic, and for automatic, semi-automatic, or manual control; and, though delayed for a time by war conditions and influences, it is certain that in due course there will be considerable extensions. In fact, it is impossible to conceive of notable railway progress without corresponding developments in regard to power signalling, for, although heavy and frequent traffic can be operated by manual signalling, a general policy of utilising track capacity to its maximum will call for the aid of power signalling, more or less automatic, wherever practicable.. Additions to electrically-worked suburban lines, particularly if dense traffic is involved, will necessitate further automatic and semi-automatic signalling installations; and in other circumstances progress in traction and traffic equipment and material must have its counterpart on the signalling side. Economic and other factors will also become more and more urgent in this respect, and that before very long, for with higher wages, reduced hours of labour, and other influences, there is now greater reason for the partial replacement of manual by power equipment. Under pre-war conditions, while traffic could be worked efficiently by existing manual equipment, it required a strong case for replacement by expensive power plants; now, economic and labour considerations are added to traffic-working aspects, and in due course considerable extensions may be anticipated for these and associated reasons.

For dense-traffic lines automatic signalling must be installed if full track capacity is to be realised, and for the same reason junctions must also be operated by power, though necessarily with manual control. Junction working is, indeed, facilitated by the concentration of all levers conveniently together in small space, and under the control of one man;

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whereas larger manual locking frames, or two or more separate cabins, as at triangular or composite junctions, introduce livided responsibility, with, frequently, continuously hard manual labour. Necessarily illuminated diagrams and other adjuncts require to be installed, but these are advantageous in visualising train movements and in other ways, besides being essential if one man is to carry out composite and concentrated control.

There is, however, much to be said for the provision of power signalling plant on what may be termed ordinary traffic lines —that is, where train frequency is within the capacity of manual operation. In the case of busy junction stations equipment must be associated, as in the past, with comprehensive reconstruction and extension works; but in due course these become inevitable wherever traffic is heavy, and with a general policy towards power signalling it is to be anticipated that designs for new works will include power operation of points and signals. Especially will this be the case if much progress is made with intermediate installations, as suggested below, rendering it convenient to link up junction power plants under manual control with semi-automatic equipment on converging routes.

In the writer's view it is, however, in regard to intermediate sections that development of power signalling to any considerable extent on ordinary main lines is to be first anticipated. A notable example is the Woking-Basingstoke section of the London and South Western Railway. This is a section of four-track main line, carrying heavy traffic; but although all intermediate stations have usual crossovers and goods yards and sidings, and a few junctions are involved in the 24 miles, signalling is normally automatic. Signal cabins are there, but they are "manned" only when special train movements are to be made, in which case the automatic system is "broken into," and traffic conducted under signal cabin control as long as required. All railways include sections of this kind, whether two or four-track, and it may be suggested that here is wide scope for the installation of power equipment. At stations it is sufficient to have one or more qualified men available to "man" the boxes as required; at other times automatic signalling proceeds uninterruptedly. Intermediate signal cabins would be required to be opened still less frequently. At junctions where a branch is operated substantially distinct from the main line there need be no interference, except when through trains are operated or vehicles require to be transferred. The branch trains can, therefore, usually be dealt with independently of the main line, and although the box may then require to be manned, it does not follow that the through automatic system must be broken into.

In any case, a large proportion of the traffic can pass under automatic control, though the semi-automatic possibilities enable special traffic movements to be made as at present, and under full control and protection. Indeed, as between boxes which are "staffed" there is always complete communication, though the usual code signalling may need to be partially replaced by instrument indications which, however, serve the same purpose.

That power signalling is expensive goes without saying. But whereas isolated plants have less scope to indicate eventual economy, more comprehensive equipments, especially of the relatively simple character involved by intermediate straightforward sections of line of reasonable length, should indicate earlier their eventual value. It is then an easy step towards power equipment of the bigger junctions upon which such intermediate sections converge.

There is already a tendency towards operating outlying signals by power, as well as those whose purpose is merely to break up long sections without crossovers or sidings. This will, no doubt, be further developed in the near future, and will also assist development on the lines suggested. On a small scale storage batteries provide electrical power quite satisfactorily, as also for track circuits as at present employed; but on a larger scale other means of supply will be necessary. Several railways now light series of stations electrically from a power station at a junction or principal town, and this practice offers further possibilities. With the extension of electric traction, supply of current for both station lighting and power signalling becomes at once available. Or it may be desirable to provide a small generating plant to serve a section of line. In any

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A METROPOLITAN RAILWAY EXPERIMENT WITH 'POSITION LIGHT" SIGNALS.

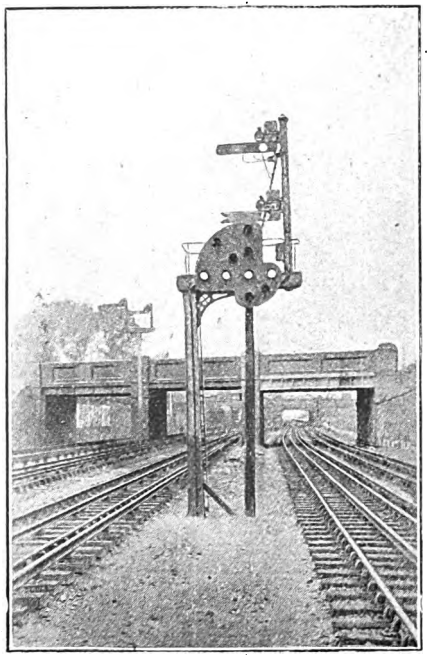

Fig. 1.—"Stop."

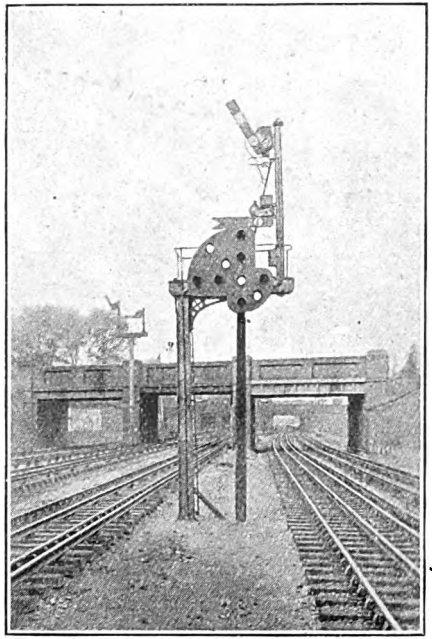

Fig. 2.—"Caution."

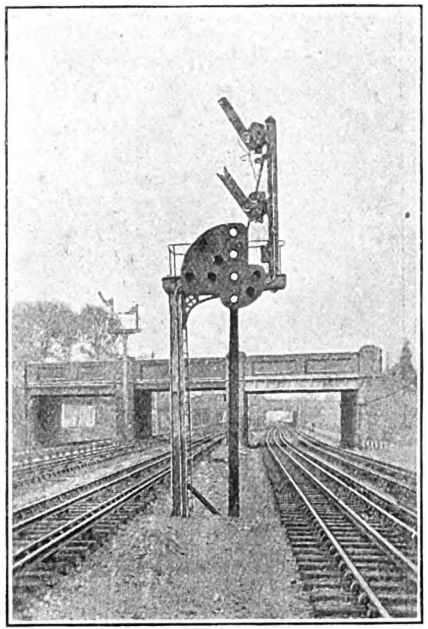

Fig. 3.—"Clear."

This experimental installation was erected at Willesden Green for trial purposes, and the ordinary upper-quadrant signals remain in use as shown. "Position-Light" indications are given by electric lamps switched in or out to give the required combinations.

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case, electric current supply for operating points and signals (or signals only) electrically, or for running small air compressors for pneumatic operation, and for track circuit purposes, is not likely to be a prohibitive factor, given the admitted desirability of automatic and semi-automatic signalling, as suggested.

In regard to other factors, it may be suggested that with the extension of power signalling there will be wider use of the upper quadrant semaphore, and probably, though this is less certain, of the three-position signal. The former simplifies and lightens the mechanism, and utilises the arm as its own counterweight to ensure a danger indication in the event of failure, while the latter combines two signals in one. Further use of "light" signals, even for day use, is also probable, though their visibility, whether on the coloured light or "semaphore light" principle, under high speed main-line conditions has yet to be established in British practice. In the United States there are some such installations which can be considered as satisfying main-line conditions.

It will necessarily follow, should intermediate semi-automatic signalling be considerably extended, that fewer signalmen will be required; and in many cases it will be sufficient to have porter-signalmen available for occasions when automatic working is broken into. Busy junction cabins can also be operated with fewer men, and some cabins dispensed with altogether. This is only in accord with the tendencies of the age, and is the inevitable accompaniment of progress; but it has its compensations in that there will be at least equivalent additions to the ranks of skilled linesmen and signal mechanics required for upkeep, maintenance, and oversight of signalling equipment; while every additional traffic facility and convenience has its effect in inducing and creating traffic, thus involving further labour demands. Furthermore, equipment can only be gradual, and so the labour side of the matter will solve its own problems, stage by stage, and virtually as they arise.

A RACE SPECIAL ON THE NEW ZEALAND GOVERNMENT RAILWAYS.

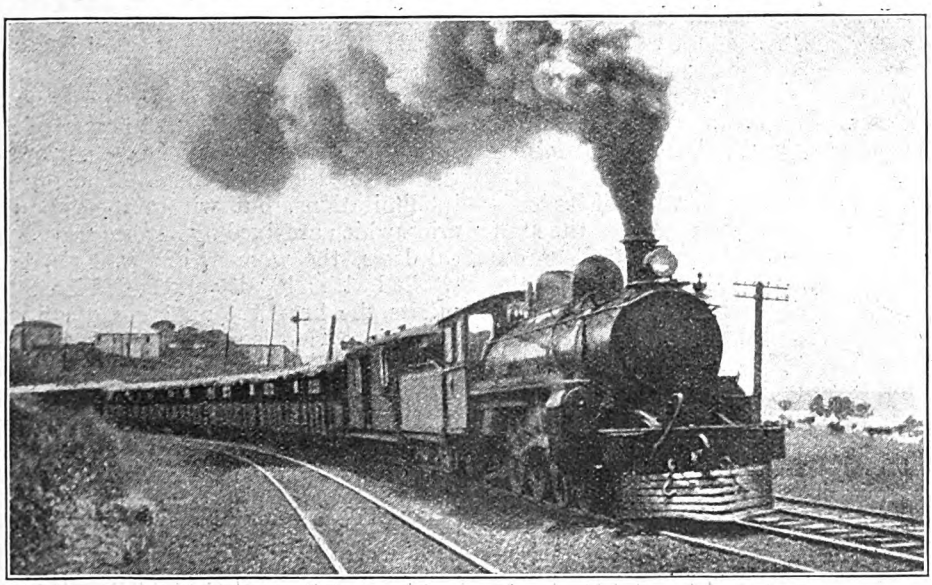

Photo.] [*W. Stewart.*

SPECIAL RACE TRAIN LEAVING AUCKLAND FOR ELLERSLIE RACE COURSE, BOXING DAY, 1918.

Four-cylinder compound 4-6-2 engine, No. 426, class A.

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Looking Backward.

A METROPOLITAN RAILWAY WARTIME RETROSPECT.

IN reviewing the general management of the Metropolitan Railway since those fateful days in August, 1914, when the war clouds burst over a bewildered world, down to the signing of the Armistice in November, 1918, one is struck, at the onset, by the number and perplexity of the problems which, in common with other railways, it had to face, and secondly by the skill with which a happy and successful solution was found for every knotty point that came along for consideration.

True, the Metropolitan Railway is fortunate in the possession of a general manager of such wide experience in traffic working as Mr. R. H. Selbie, but it must be remembered that in 1917 he was called upon by the Government to become Director of Horse Transport for the Board of Trade, while Mr. John Wardle, the Company's Commercial Manager, was, during the war, twice lent to the Government for certain periods ; first as Director of Cold Storage and Inland Transport of Food and afterwards as Director of Transport at the Ministry of Information.

In addition to the war work of its leading officers no fewer than 1,200 of the staff of the Metropolitan Railway in all grades representing more than one-third of the total staff, joined His Majesty's Forces, and of these 127, as shown by the company's Roll of Honour, laid down their lives for King and country. Of each and everyone of them who made the supreme sacrifice, let us say *requiescat in pace.*

The absence of such a large number of officers and men makes the excellent record of this railway's war working and war work all the more remarkable. Regular users of the line recall with much appreciation how very little real railway inconvenience they suffered throughout the prolonged period of the war.

This commendable consummation was largely the result of the introduction, and the intelligent use of female labour in the Metropolitan Railway service. At the present time the demobilisation of women workers is taking place in many spheres of industry, including the line in question, and it is felt that a review of the work so efficiently performed by the female employees of the Metropolitan Railway will compare favourably with any of the essential industries that have been in operation during the past five years.

To take the place of men who joined the Colours women came forward and embarked upon the work in all grades necessary for the traffic requirements of the railway. The posts filled widely differed in character, but they embraced those of guards, conductors, porters, booking clerks, ticket collectors, travelling ticket examiners, bill posters, carriage cleaners, clerks, and numerous other positions and offices.

The management of the Metropolitan Railway speaks in highest praise of the way in which the women have performed the duties desired of them. The sex has its limitations, but within those boundaries, which are fixed by natural and physical laws, the women, one and all, have worked with a loyalty and enthusiasm that merits the heartiest applause of all who appreciate what is meant by British pluck and British endurance. While the men were absent fighting for hearth and home these worthy women—mostly in early life—courageously carried on the conduct of railway work in summer and in winter, through heat and cold, to say nothing of those dangerous periods of snow and fog with which the practical railwayman in and around London is familiar. It must be remembered, too, that most of the lines of the Metropolitan Railway were well within the London air-raid area, and all credit is due to the women and girls who so

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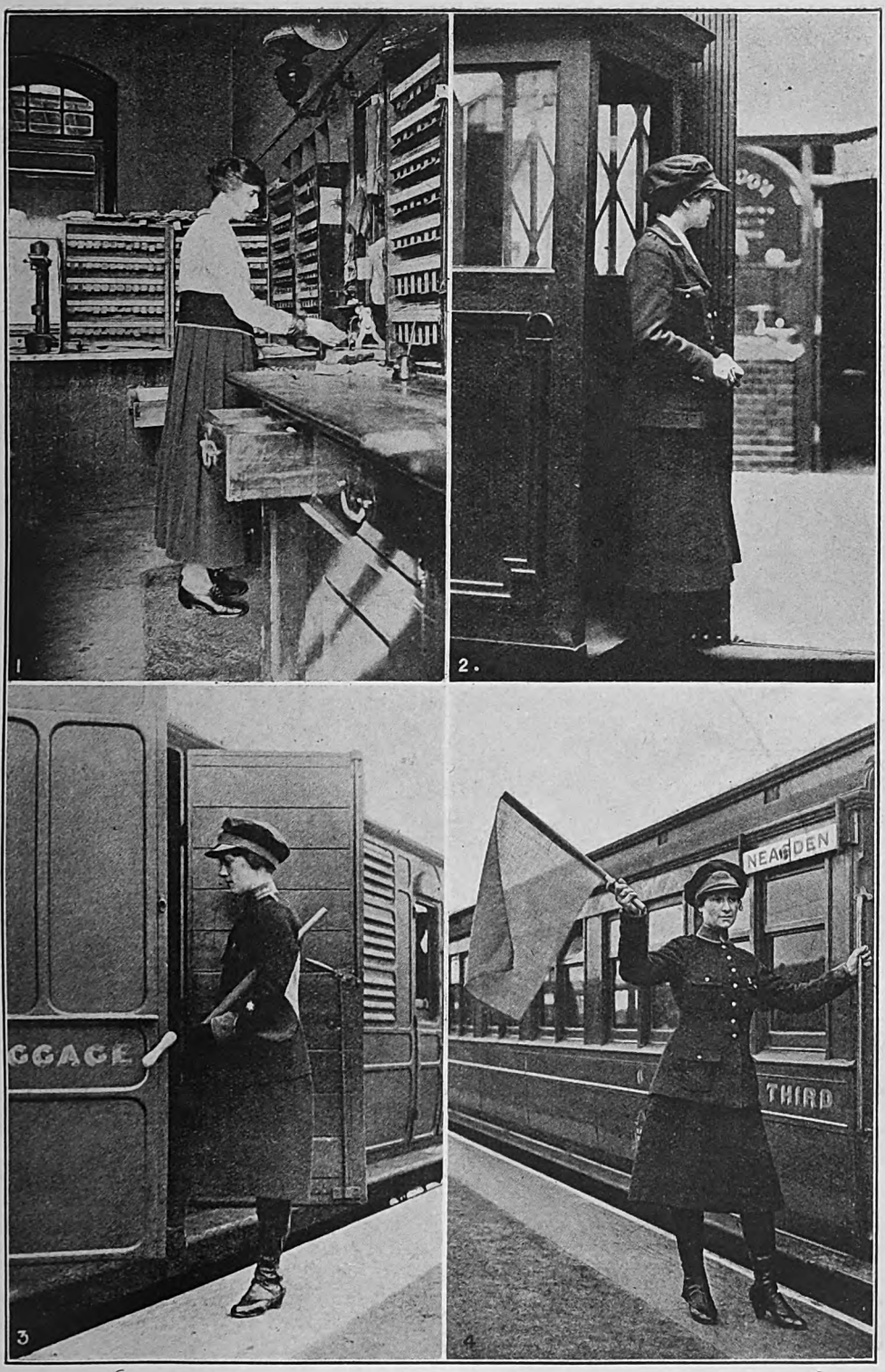

Photos.] METROPOLITAN RAILWAY. [*A. Reavil.*

1. Booking Clerk.
2. Ticket Collector.
3. Assistant Guard.
4. Conductor.

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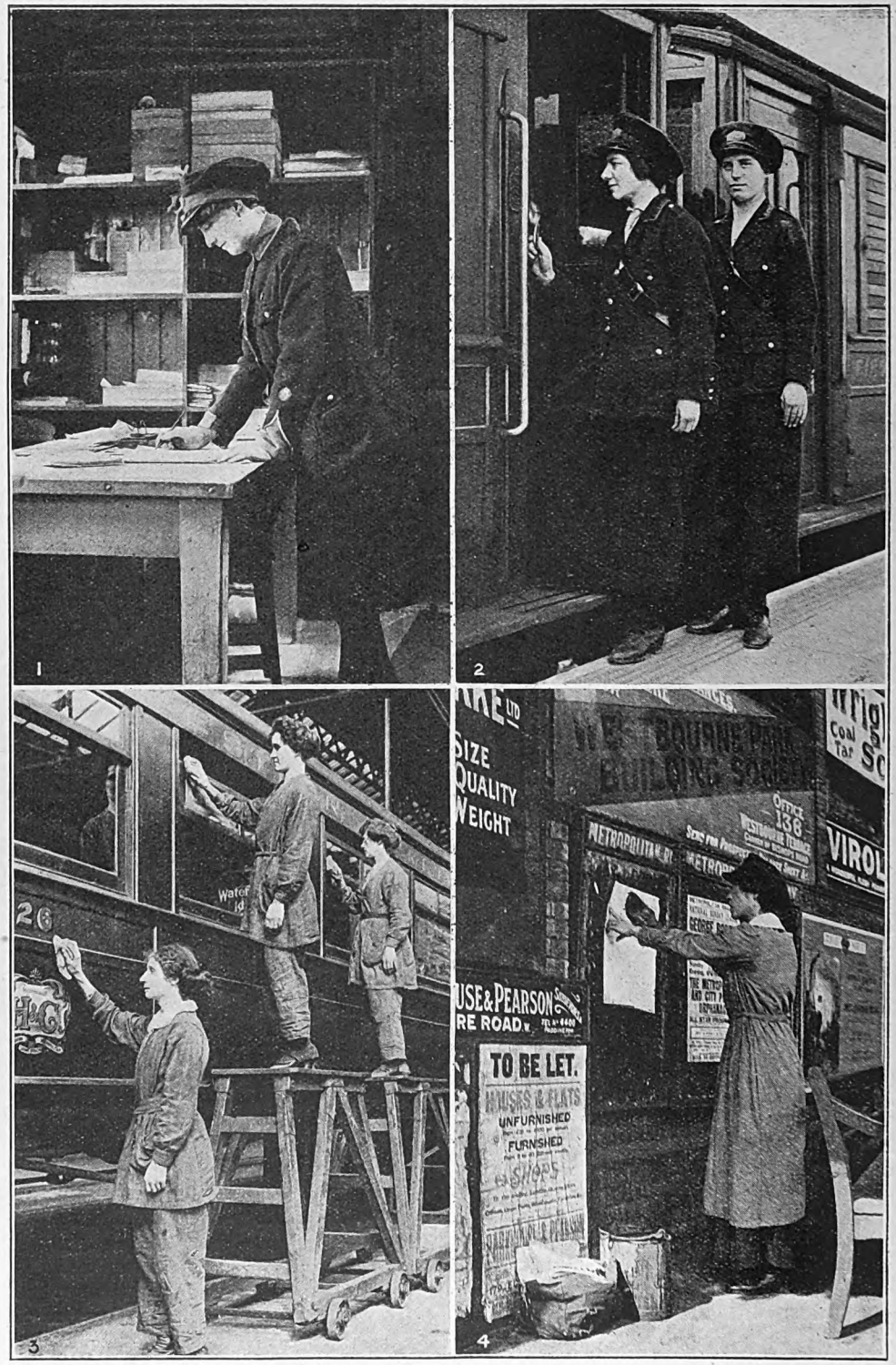

Photos.] METROPOLITAN RAILWAY. [*A. Reavil.*

1. Assistant Guard signing on duty.
2. Travelling Ticket Inspectors.
3. Carriage Cleaners.
4. Bill Posters.

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nobly stuck to their posts throughout such nerve-straining and trying times.

In addition to their ordinary duties the general staff of the Metropolitan Railway, who were carrying on the work at home, in order to devote to the nation's service what spare time could be wrested from their increased duties, formed a "War Service Corps," divided into a number of groups, who undertook the following voluntary services :—

The reception and entertainment of wounded soldiers, and entertaining at hospitals.

Providing gifts to men of the Metropolitan Railway on active service, and parcels for prisoners of war.

Munition work at shell depôts.

Red Cross detachments.

Vegetable cultivation for hospitals.

Organisation and equipment of rifle clubs.

Women's work.—Hospitals, sewing classes, soldier's buffet duties, collection of books, periodicals, &c., for military and naval hospitals, and flowers for ambulance trains, pipe, tobacco and cigarette collection for wounded soldiers.

In July, 1917, and in August, 1918, the present writer described in the RAILWAY MAGAZINE, in detail, the war-time cultivation of railway vacant land as carried out by Metropolitan Railway enterprise, and it is not here intended to recapitulate all that was then said. At the same time no review of Metropolitan Railway war-time activities would be complete without a passing reference to the success that attended the efforts of the Company and primarily Mr. E. Charles Short of the Commercial Manager's Office, in promoting the transformation of the most unpromising looking waste land into food-producing areas of a value that can only be correctly estimated when it is remembered how dangerously short of food stuffs England was getting at the time the undertaking was put in hand. Other railways did much to encourage additional food production, and to all of them no small measure of praise is due, but the Metropolitan Railway was the only line that boldly placed all its vacant waste land under the administration of a commercial manager for the production of vegetables and the raising of crops.

Mention should likewise be made of a fund established by the Metropolitan Railway officers and staff which has been the means of enabling a committee closely to look after the dependents of Metropolitan men absent serving with the Colours. The duties of this Committee may have been arduous, but the result was peace of mind for many a fighting man.

To preserve the memory of the employees who lost their lives in the war, the officials and staff of the Company are raising funds for the establishment of a memorial, and a three-fold scheme has been resolved upon, as follows :—

1. To erect a permanent tablet on the Baker Street Station, bearing the names of the Metropolitan Railway men who fell in the war.

2. To lay out and equip an athletic ground for the use of the staff. The Board of Directors has generously offered to place at the disposal of the men for this purpose 13 acres of land at Wembley, already partly arranged as a sports ground.

3. To build a club or institute, where members of the staff may meet for social, educational and recreative purposes.

For the foregoing purposes, at the time of writing a sum of £2,660 has been collected, but the fund is growing daily.

It is by a study of the past we are able to understand the present, and—if we are venturesome—to foretell the future. The administration of staff matters on the Metropolitan Railway has, for a course of years, been conducted on common-sense but sympathetic lines. While "grandmotherly legislation" has been conspicuous by its absence, never have the humanities been forgotten. Surely herein lies the secret of the smoothness of the wartime working of this progressive London line that radiates from Baker Street !

W. P.

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The WHY and the WHEREFORE

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which was published in April, 1919, price 5s. net, by post 5s. 6d.*

Locomotive Exchanges.

Exchanges of locomotives have taken place between leading railways on several occasions in the past, but the most notable were those of 1909-1911. In June, 1909, London and North Western Railway 4-4-0, No. 412 *Marquis*, and Great Northern Railway, 4-4-2, No. 1449, were exchanged; while in November of that year London and North Western Railway 4-4-0, No. 7, *Titan*, worked between Rugby and Brighton, balanced by London, Brighton and South Coast Railway superheater 4-4-2 T. No. 23. Also in that year Caledonian Railway No. 903 *Cardean* worked between Carlisle and Crewe, and a London and North Western Railway 4-6-0 between Carlisle and Glasgow. In 1910 besides the great exchange between London and North Western Railway 4-6-0 No. 1471 *Worcestershire* and Great Western Railway 4-6-0 No. 4005 *Polar Star*, Highland Railway 4-6-0 No. 146 *Skibo Castle* and North British Railway No. 867 were tested on both railways concerned. In addition, North British Railway 4-4-2 No. 881 *Borderer* worked between Carlisle and Preston in exchange for a London and North Western Railway 4-6-0. In Ireland the Great Southern and Western Railway and Great Northern Railway exchanged 4-4-0 engines.

[Reply to R. G.]

Record Runs.

It was on July 14, 1903, that the record to which you refer was achieved by the Great Western Railway Company. The train concerned was the 10.40 a.m. *ex*-Paddington, of which a first portion of five cars, weighing in all 130 tons, was run non-stop to North Road, Plymouth (instead of to Exeter, as scheduled) in 3 hours 53 min. 35 sec., the distance covered, *via* Bristol, being 245 miles 53 chains. Swindon was passed in 68 min, 7 sec., Pylle Hill (Bristol) in 104 min, 42 sec., and Exeter in 172 min. 34 sec., the respective distances by this route being 77 miles 22 chains, 118 miles 57 chains, and 193 miles 50 chains. The engine concerned was an inside-cylinder 4-4-0—No. 3433, *City of Bath*—driven by Burden. Additional interest attaches to the run in that the Prince and Princess of Wales (the present King and Queen) were passengers by the train.

[Reply to "RAILWAY WORKER."]

Condensing Tank Engines: South Eastern and Chatham Railway.

Tank engines fitted for working to Moorgate Street, and in view of other services which used to be operated *via* the Metropolitan widened lines, are adapted for condensing in tunnels. Steam is then diverted into the water tanks and the pipes you mention are provided as exhaust vents for any steam not condensed.

[Reply to "INJECTOR."]

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2-6-2 Type Express Engines.

We are aware that the Italian State railways employ a considerable number of 2-6-2 express engines, and the type has also enjoyed a limited vogue in the United States, but in practically no other countries. Hitherto English locomotive engineers have, since the introduction of the leading bogie, shown a marked preference for that method of carrying the leading end of a locomotive intended to run at high speeds; in this connection it must not be forgotten that speeds in this country are considerably higher than in Italy. The widespread use recently, however, of 2-6-0 engines, many of which not infrequently take turns in the working of express trains (not to mention the numerous 2-2-2 and 2-4-0 engines which performed all the principal express work in past years) clearly proves that there is no objection to the use of suitably-designed 2-6-2 locomotives for express trains.

[Reply to J. N. PHILLIPS.]

Heating Surface.

It is a great mistake to suppose that an increase of heating surface necessarily means a corresponding increase in the amount of steam produced in a locomotive boiler. Cases are actually on record in which a *reduction* of heating surface (in the case of a boiler too crowded with small tubes) has effected an improvement in steaming. In the case of the "300" and "415" 4-4-0 classes on the London and South Western Railway, which you mention, it was doubtless found desirable to use fewer tubes proportionately to the cross-sectional area of the boiler in the latter class than in the former, which accounts for the slight difference of 50 sq. ft. only in their respective heating surfaces.

[Reply to "BOGIE."]

The Heaviest Locomotive in Scotland.

Exclusive of tender the heaviest express engines in Scotland are Mr. Pickersgill's new "60" 4-6-0 class on the Caledonian Railway, weighing 75 tons in working order; next come the North British Railway "Atlantics," 74 tons 8 cwt., closely followed by the Caledonian Railway, 4-6-0 "Cardean," 74 tons 5 cwt. But the last-mentioned class, with its huge bogie tender, easily tops all other competitors in engine and tender weight with an aggregate of 131¼ tons. Heaviest goods engines are the McIntosh 0-8-0's on the Caledonian Railway, weighing 62½ tons without tender, and of tank engines the Pickersgill 4-6-2's of the same railway, 91 tons 13 cwt.

[Reply to D. BAKER.]

Thermostatic Feed Regulators.

We cannot see any adequate reason for the installation of thermostatic feed regulators (*i.e.*, automatic arrangements for keeping the boiler constantly fed with water) on a locomotive. In view of the expense involved and the comparatively simple operation of locomotive feed regulation it would hardly seem a paying proposition. Automatic feed coupled with automatic stoking in conjunction might, from the manual point of view, enable firemen to be dispensed with, but for other reasons the reduction of the locomotive crew from two to one would not be desirable.

[Reply to J. N. PHILLIPS.]

Present-day Locomotive Efficiency.

It would be impossible to give an exact answer to the points you raise. Locomotive efficiency in this country is undoubtedly, as a general average, at a lower ebb than it would be in normal times, for reasons which are generally known and appreciated, but what the actual percentage of this temporary efficiency loss is can only be a matter of the purest speculation. So also is any estimate of the period likely to elapse before we return to pre-war time-tables, if, indeed, a complete return to pre-war standards of speed comes about at all in the future.

[Reply to W. L.K.]

Head Codes, Caledonian Railway.

It is found necessary on this system, owing to the exceptional number of main line routes, especially in the Carstairs-Glasgow-Edinburgh-Stirling area, to adopt a head code which shall indicate the route followed by each train. The London, Brighton and South Coast and South Eastern and Chatham companies, for a similar reason, do not employ the national code of headlights, neither does the Great Eastern Railway in the London suburban districts.

[Reply to D. BAKER.]

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Undesirable Queries.

Such queries as "Could you give me the names of the signal-boxes from Saltburn to Darlington in order?" or "Could you tell me the numbers and classes of the engines stationed at Erimus Sheds, North Eastern Railway?" are not suitable for inclusion in these columns, as we point out in the rules relating to questions. Such lists of names or numbers involve us in considerable trouble in collecting the necessary information, take up a large amount of space in the replies, and then are probably of no interest to any reader other than the querist himself. Seeing that you reside at Middlesbrough you could obtain for yourself without any difficulty an answer to the former question by simply writing the names of the boxes as you pass them when next travelling to Saltburn or to Darlington.

[Reply to J. B. WEDGWOOD and G. D. RUSSELL.]

Through Carriages and "Bradshaw."

In view of the comprehensive nature of "Bradshaw" it would be impossible to indicate through carriages as a general principle, even on the reduced scale now obtaining. Usually where special reasons apply such facilities are indicated. Some of your other suggestions have been passed on to the publishers of "Bradshaw," but we may point out that transport is essentially in a transition stage at present, and this influences the compilers of this publication as well as the railways.

[Reply to S. GREENHILL.]

Great Western Railway Gradients.

It would take far too much space to set forth these in detail. They have been described in various issues of the RAILWAY MAGAZINE, and referred to incidentally by Mr. Allen on many occasions. We understand that *The Great Bear* works only between Paddington and the Bristol district.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

Snow Hill Station, Birmingham.

This was fully described in the RAILWAY MAGAZINE, August, 1912. There are four through platform lines and four bay platform lines. Through platform lines have two numbers for each portion, so that 12 platforms are referred to for locating trains. The long ones are nearly a quarter of a mile long and the bays about 500 ft.

[Reply to G. H. WEST.]

Double Distant Signals.

In order to provide a "double-sight," to provide for cases where a driver's view is obstructed in certain positions by bridges or other causes intervening, distant signals are sometimes repeated. There is, however, a considerable space between the two arms, and the lower is known as a "Repeater" signal.

[Reply to V. E. HOPE.]

Compound Engines, Midland Railway.

There are 45 3-cylinder compound 4-4-0 express locomotives on the Midland Railway, Nos. 1000 to 1044 inclusive (in addition to a small number of 2-cylinder compounds of the same wheel arrangement on the Northern Counties Committee section, which is owned and worked by the Midland Railway in the North of Ireland).

[Reply to R. A. FAIRBROTHER.]

Midland Railway Locomotives.

4-4-0 engines are quite capable of working the heaviest trains regularly operated on this line. Should it be desired to run heavier trains without piloting no doubt larger engines will be introduced in due course; but the matter is one resting with the traffic officers and the chief mechanical engineer.

[Reply to R. S. ELLIS.]

Cromford and High Peak Railway.

This runs from the High Peak Canal at Whaley Bridge to the Cromford Canal at Cromford. It was leased by the London and North Western Railway in 1862, and taken over entirely in 1887. Very steep gradients were involved, certain sections being operated by stationary engines and wire ropes.

[Reply to WALDRON J. POTTER.]

Unusual Names for Locomotives.

Many of these have a local significance, as for example "One and All" and "Tre, Pol and Pen," applied to Great Western engines. These are associated with Cornish folk-lore, customs and the like. Your query, "Train Indicator in Box," is covered by reply to "Peckett," last month.

[Reply to "POLAR STAR."]

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Lettering on Goods Brakes : Midland Railway.

In connection with the system of traffic control employed on the Midland Railway, large movable letters (black on a white ground) are placed on the sides of the goods brakes to give an indication in code of the destination, stops, &c., of the train concerned.

[Reply to R. S. COMMANDER.]

Great Central Railway Locomotive "Lord Faringdon."

Your query is not understood. The vacuum automatic brake is standard on the Great Central Railway, and all passenger and a large proportion of the goods and mineral engines have the necessary equipment.

[Reply to J. V. HALL.]

Locomotive Tenders.

It is by no means unusual for engines to run with tenders other than their own. Should repairs be required to a tender it is manifestly unnecessary for the engine to be laid up also, so it is supplied with a tender from an engine which is in the shops, or a spare.

[Reply to D. W. A.]

Bala Junction.

There are several instances where junction stations do not appear in public time tables, as they are erected purely for exchange purposes and passengers are not booked thereto or therefrom. The booking office, if provided, is for re-booking purposes.

[Reply to W. H. ROBINS.]

Locomotive Statistics in the "Railway Year Book."

Many statistics are not now available in view of the restricted particulars and returns made public during the war period, and owing to the special conditions under which the railways have been, and still are, conducted.

[Reply to J. W. B. TUNSTALL.]

Motor-Trains on the London and South Western Railway.

Many of these were withdrawn with the closing of halts and restriction of train services. With restoration of facilities no doubt these, or corresponding trains, will be reintroduced.

[Reply to J. C. SEARLE.]

Locomotives at Richborough.

Engines observed by you have no doubt been returned from France *via* the Richborough train ferry. All locomotives in army service were attached to the Railway Operating Division, hence the initials "R.O.D."

[Reply to R. C. H.]

Colours of American Locomotives.

No definite replies can be given to your queries, but the general tendency in the United States is, we believe, towards a plain black coating of paint, though a few lines adopt a limited scheme of lining out.

[Reply to A. L. ROTHERHAM.]

Midland (L. T. and S. Section) Locomotives.

Except for the 4-6-4 tank engines, none of these have been superheated. 4-4-2 engines with extended smokeboxes have had these provided when fitted with suitable standard boilers at Derby.

[Reply to "SOUTHERN SECTION."]

Colours of G.W.R. Locomotives.

We cannot predict whether the elaborate pre-war painting and lining out will be resumed. Presumably a definite scheme of painting will be re-introduced; but it will probably be simpler than in the old days.

[Reply to A. E. NEWBERY.]

Damper Cylinders.

It is presumed that you refer to the cylinders fitted on the side of the smokebox of many superheater engines for the purpose of operating the dampers used for shielding the superheater elements when steam is cut off.

[Reply to E. J. F. KING.]

G.W.R. 2-8-0 Engine No. 4700.

As the first of its class this engine is naturally of an experimental nature; but if satisfactory in service would naturally be followed by others to constitute a distinct class.

[Reply to "SWINDON."]

"Train Following" Boards, London and South Western Railway.

A small board or disc, lettered "S.T.," attached to the back of the last vehicle of any London and South Western train indicates that a special train is following.

[Reply to "WIMBLEDONIAN."]

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London, Brighton and South Coast Railway "Terriers."

These engines were designed primarily with a view to work on the South London line, but the first few of them were used on the East London Railway, South London working following soon after, if it did not occur actually concurrently. Mr. Ahrons mentions that in 1878 he used to see at Liverpool Street Nos. 49, 54, 58, &c., instead of Nos. 70–75.

[Reply to CAPT. G. CULLIS.]

London and South Western Railway 4-4-0 Engines.

Latest figures available give the total number of engines of this wheel arrangement on the London and South Western Railway as 302.

[Reply to "BOGIE."]

0-4-4 Tank Engines: London and South Western Railway.

The first of these, designed by the late Mr. D. Drummond, were built in 1896, and later series have included very slight variations.

[Reply to "BOGIE."]

Pullman Cars: London, Brighton and South Coast Railway.

There are 28 named and 11 numbered cars on this railway. As to names and numbers please see rules at head of these columns

[Reply to R. J. DUFFELL.]

Train Working at Market Harborough.

London and North Western trains work through between Nottingham (London Road) and Northampton (Castle) *via* Market Harborough, and do not terminate there unless so booked.

[Reply to J. S. SEWELL.]

Colours of the L. & S.W.R. Rolling Stock.

We understand that it is intended to adopt green as the colour for passenger coaches used for the steam-operated services, as well as for those on the electric routes.

[Reply to P. E. F. W.]

Furness and Cambrian Locomotives.

The Furness Railway has 136 locomotives and the Cambrian Railway 98. Information of this character is given in the "Railway Year Book."

[Reply to F. W. LUPTON.]

Locomotive Working: Midland Railway.

The 4–4–0 compounds regularly work into London. Indeed, they haul a good proportion of the principal expresses south of Leicester and Nottingham.

[Reply to D. W. A.]

5 ft. 7 in. 4-6-0 Engines, London and South Western Railway.

At the time of going to press none of this type (the small-wheeled variant of the "736" class) has been put in service.

[Reply to "WIMBLEDONIAN."]

Night Mail Train: Great Western Railway.

We understand that the 9.5 p.m. mail train at Paddington works right through to Penzance.

[Reply to G. W. M. R.]

American Locomotives on the G.N.R.

We believe that all of these, likewise those on the Great Central and Midland Railways, have now been broken up.

[Reply to E. J. F. KING.]

Metropolitan Railway Gradients.

From Baker Street through St. John's Wood is very steep, in places as severe as 1 in 40.

[Reply to R. WHEATLEY.]

Irregular Exhaust.

Irregular puffing of locomotives generally arises from the fact that the valves require setting.

[Reply to J. W. B. TUNSTALL.]

Great Central Railway Tank Engines.

We understand that there are 20 of the 2-6-4 type and 4 of the three-cylinder 0-8-4 type.

[Supplementary Reply to G. C. GOLD.]

Rail Lengths: G.N.S.R.

Standard rail length on the Great North of Scotland Railway is 30 ft.

[Reply to F. J. GALER.]

Lynton and Barnstaple Railway.

This was opened May 16, 1898. See "Railway Year Book."

[Reply to "BOGIE."]

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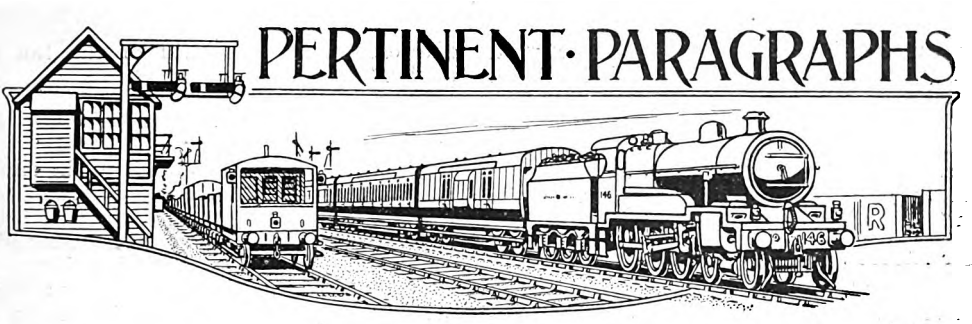

Mr. Acworth and the London Traffic Problem.

In the course of a paper read before the London Society recently by Mr. W. M. Acworth, the author argued that whatever may be the public view of the traffic difficulties in London, the "Underground" companies cannot be accused of profiteering, and he made out a strong case on the basis of construction and working costs of the tube lines, and in view of traffic statistics on all railways, that big developments cannot be undertaken by commercial enterprise, nor can new schemes be lightly contemplated under present conditions. A railway is, after all, only a factory, producing transport, and sooner or later the public must meet the increased costs, either in raised fares or in the form of subsidy by national tax or local rate. He also expressed the opinion that there is little justification now for workmen's fares at the rate of four or five miles for 1*d*. Democracy does not mean substituting a privileged class of workmen for a privileged class of aristocrats, but equality for all. It was also mentioned that neither in Paris nor New York have the underground railways had to purchase property for the erection of station buildings; they are below the streets and reached by staircases from the pavements.

Mr. Selbie on Metropolitan Traffic.

Before the House of Commons Committee enquiring into the London traffic problem, Mr. R. H. Selbie, C.B.E., General Manager, Metropolitan Railway, made a statement, some points from which may be given: The Metropolitan Railway Company is responsible for the operation of about 88 route miles of line in and around London. Of this distance, 36 miles are worked electrically and the remainder by steam. The company is entirely independent of the Underground Combine, but works in harmony with that system, and has a comprehensive arrangement for through bookings. Since 1913 the traffic over the Metropolitan line, particularly the electrified part, has very largely increased, and this increase has been most marked since the signing of the Armistice. Near estimates showed that in comparison with the 115,000,000 passengers carried in 1913, the carryings in 1918 were 145,000,000; and for 1919, based on the first three months, they would be 169,000,000. Thus present traffic showed an increase of 48 per cent. over 1913, and this without taking into account military traffic, where men did not take ordinary tickets.

Traffic Pressure on Metropolitan Section.

In ordinary times this large growth of traffic would have been met by an increase in the rolling-stock, but during the war it has been impossible to get any such stock constructed. The company was fortunate in being able to get delivery in the early part of the war of some new stock previously ordered, which increased the number of coaches from 411 in 1913 to 445, but this increase of 9 per cent. went a very small way towards meeting the increase of 48 per cent. in traffic. The average number of passengers carried per seat has increased from 5,221 in 1913 to 7,320 at the present time, an increase of 40 per cent. All the company's rolling-stock is in service, and it is only with the greatest difficulty that opportunity is found to take trains into the shops for repairs and overhaul.

The maximum number of trains per hour over the busiest section, between Baker Street and Moorgate Street, is 39, *i.e.*, in one direction on one pair of rails. With the present type of trains it is almost impossible to increase this number. Length of trains varies from seven cars to three, on different sections and at different times of the day, according to the traffic to be carried, the standard unit being six cars. Overcrowding during the rush hours, morning and evening, could only be met by a number of additional trains, and by increasing the length of those at present scheduled. Increase of the station stop from an average of 25 sec. at the heaviest point to 55 sec. means 10 fewer trains per hour passing, or a reduction of 25 per cent. in carrying capacity. The Metropolitan Company had had this problem under

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careful consideration for some time past, with the result that a type of train had been evolved (described last month) which will be able, however congested the traffic, to complete its station work considerably under 25 sec. An experimental train of this type is under construction, and it is hoped would be in traffic within a few months.

Sir Albert Stanley's Statement.

BEFORE leaving for America, on a voyage of recuperation after his recent serious illness, Sir Albert Stanley, M.P., Chairman of the Underground Railways Company of London, Limited, made a statement as to the programme of his board in regard to the congestion on the Underground :—

"My colleagues all agree with me that the public have had much to put up with in the last few months. Increased fares, which were unavoidable if the companies were to keep going, coupled with inadequate services, have naturally caused irritation. I think I can promise that increase in fares, other than mere local adjustments, has come to an end for the present. As regards services, we recognise that all possible temporary relief must be given until both railways and omnibus services can be permanently improved. The railways have experienced great difficulty in keeping the rolling-stock in proper repair; but steps are being taken to meet the difficulty, and the services will be improved as rapidly as cars can be made available. As for more permanent improvements in the situation, the companies are in process of carrying out the following programme :—

(1) To acquire as quickly as possible a large number of additional railway carriages.

(2) To reconstruct the City and South London Railway and form a connection at Camden Town, which will provide a new through north and south route through the City.

(3) To re-design and equip certain stations with escalators where the traffic is congested.

(4) To re-design the carriages on the Tube railways to make loading and unloading more rapid and convenient.

(5) Subject to the approval of the proper Government Department, to construct and place on the streets a new and improved type of omnibus.

"These improvements would all have been in operation ere now had not the war come and stopped everything. They will cost several millions sterling, and the financial prosperity of the undertaking is essential if this large sum is to be found. The policy of the company is to provide the best passenger service at the lowest possible fares, to make the undertaking a credit to London, playing a worthy part in dealing with London traffic and earning the goodwill of the London public."

Chalk Farm Alterations : London and North Western Railway.

IN 1913 reference was made to the extension scheme of track rearrangement at Chalk Farm, London and North Western Railway, and a photograph was reproduced showing a model of the work as it will be when completed. Briefly the scheme involves a series of over and under connecting lines so arranged that trains from almost any line to any other line can pass without interfering with other traffic either in the same or the opposite direction. It has been designed in view of the promised electric trains from Euston to the Watford "new" lines, in conjunction with the construction of new tube tunnels for electric trains under Primrose Hill; but also provides for electric working from Broad Street and also for light engine and empty carriage train movements as well as ordinary steam traffic.

The undertaking also involves new lines, together with new tunnels, for electric trains at Kensal Green so that six tracks will eventually be available all the way to Watford. The section from Queen's Park northwards has been in use for some time, though at present London electric trains operate the electric service.

The works were commenced at the beginning of 1913. Normal progress was made until the close of 1914, when the number of men employed was appreciably reduced owing to many of them joining His Majesty's Forces. The works, however, were kept going and considerable further progress was made until they were stopped by order of the Ministry of Munitions at the close of 1917, when all the contractors' plant was taken possession of by the Government. At Chalk Farm the work consisted firstly of the widening of the railway on the north (up side) and the re-arrangement of existing lines on the widened area to provide for the construction of lines which are to connect the present slow lines from Euston and from Broad Street with the tunnels constructed to take the new electrified lines.

It was necessary that work at Chalk Farm should be completed by "stages," the first of which included the widening on the north side of the site already referred to, on the completion of which some of the existing lines were slewed over enabling further work to be carred out on the area formerly occupied by them. This in turn, when completed, enabled further lines to be slewed over and the further portion of the work to be taken in hand, and so on. Prior to the temporary closing of the work above referred to, construction had proceeded in this

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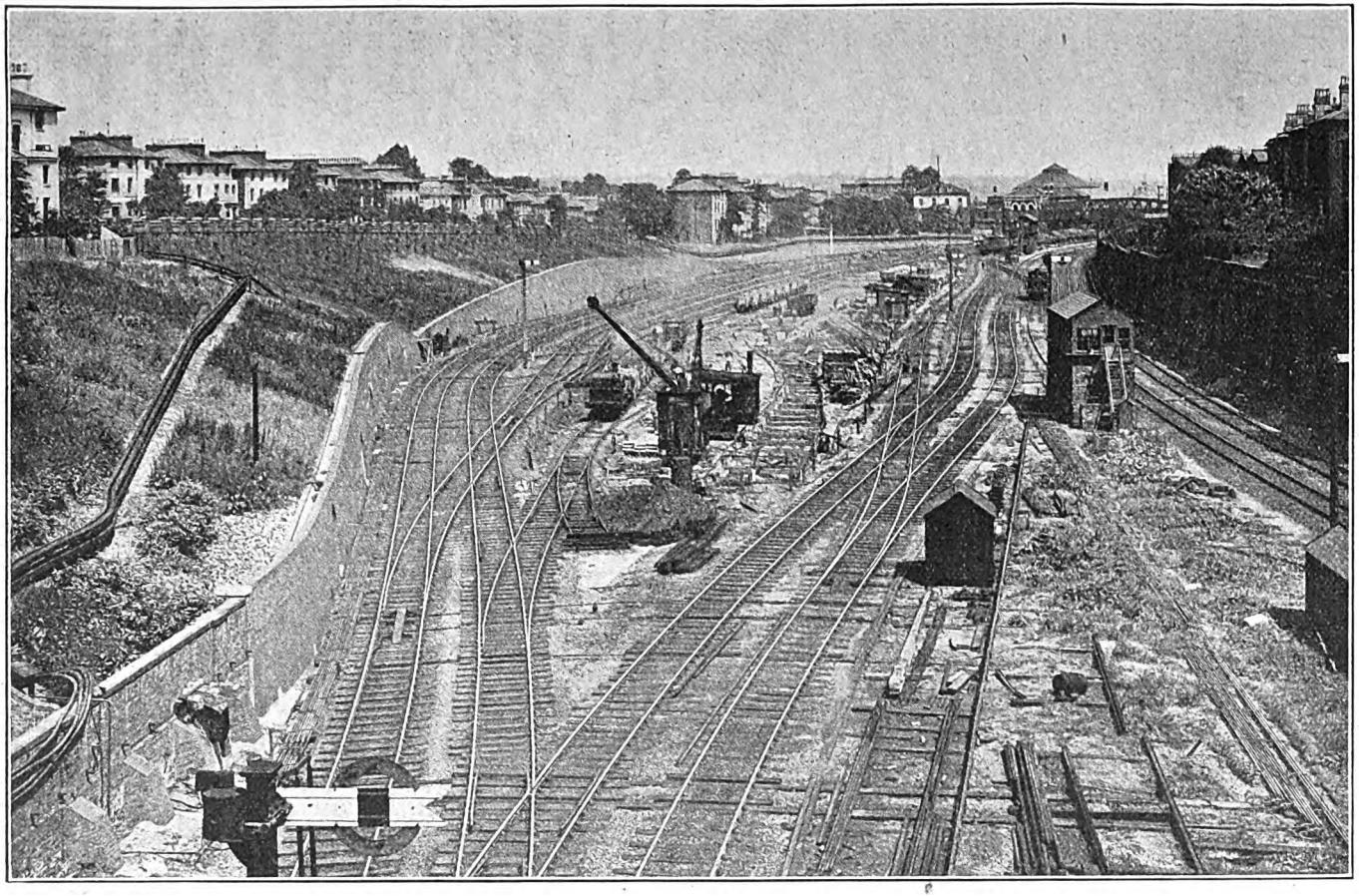

CHALK FARM ALTERATIONS: LONDON & NORTH WESTERN RAILWAY.

General View from Primrose Hill Tunnel face looking towards Regent's Park Road, showing New Retaining Wall on North (left-hand) Side and Temporary Arrangement of Lines to allow of a Clear Site for further Works in Progress about the Middle of the Area.

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manner from the northern side of the site bounded by Adelaide Road up to and including the retaining wall alongside the final position of the up slow line to Euston. Included in this is the open approach to a further new iron-lined tunnel by means of which trains of empty coaches can be brought from the carriage sheds at Willesden to Chalk Farm over the existing up slow line and cross under all lines to the departure platform at Euston *via* the up engine line on the down side of the railway, which is reached by an open approach at the other end of the new tunnel near Gloucester Road. This tunnel, like all other iron-lined tunnels on the contract, is of 16 ft. 4 in. internal diameter. Other portions completed at Chalk Farm include the cut-and-cover tunnels and approaches thereto for the electrified lines from Broad Street, which will connect with the electrified lines to Euston in under-ground junction chambers, of which that for the up line has been built. These junction chambers (cut-and-cover work, form a bell-mouth at the Chalk Farm ends of each of the new iron-lined tunnels from Loudoun Road.

A new bridge has been erected to carry Regent's Park Road across the running lines in one span of 110 ft. Work is being recommenced as soon as opportunity permits.

English Railway Stockholders Protection Association.

A MEETING for the formation of this Association was held at Cannon Street Hotel on May 27th, when Mr. C. W. Harrison was elected to the Chair. After notice convening the meeting and letters of regret from persons unable to attend had been read, Mr. A. W. Burchell, of 5, The Sanctuary, Westminster, S.W.1, was elected Secretary to the meeting. The Chairman then introduced Mr. Russell (Scottish Railway Stockholders Protection Association) to the meeting and urged the importance of railway stockholders organising to protect their interest. Mr. Russell addressed the meeting, explaining the steps taken in Scotland, and emphasising the importance of such organisations and explaining proposals for working in union with the English Association. The meeting was then addressed by Sir Robert Perks, Mr. Bosher, Mr. Boot, Mr. Webb, Mr. Bell, Mr. Hargreaves, and others. On the motion of the Chairman, seconded by Mr. Bosher, it was unanimously resolved that this meeting is of opinion that an Association of English Railway Stockholders, on the lines indicated in the circular letter of May 19th, 1919, is of vital importance, and that a Committee, with powers to add to its numbers, be appointed to take necessary steps to form the Association. Subsequently a large and influential Committee was appointed. A hearty vote of thanks to the Chairman and to Mr. Russell was unanimously passed. Immediate steps are being taken to register the Association as a company with limited liability.

Concrete Railway Exhibits at the Royal Agricultural Show.

FROM the railwayman's point of view one of the most attractive exhibits at the Royal Agricultural Show at Cardiff this year was the Railway Section on view at the stand of the Concrete Utilities Bureau, of 6, Lloyds Avenue, London. This section was very comprehensive and the increasing number of articles made in concrete by the railway companies for their own use was strikingly apparent. While concrete work has been carried out by several railways for some years past the recent shortage of timber, bricks, iron, and steel has given an impetus to this form of construction, and has led railway engineers to turn their attention more than ever to concrete as a substitute. The exhibits in this section were lent by the following railways:—London and South Western, Great Western, North Eastern, Great Northern, Midland and Great Northern Joint Committee, and the Cheshire Lines Committee.

One of the most recent applications of concrete is that for station name plates, of which examples were shown. In these black concrete letters stand out in relief upon a panel of light coloured concrete, which is supported upon concrete posts, and of a similar nature are the bridge number plates, gradient posts, and mile posts. Another feature of interest was a number of lengths of railway track laid with concrete sleepers and sleeper blocks of various designs, and a further use for concrete was seen in sections of railway station platform. Not less important were the examples of telegraph poles and signal posts complete with fittings, and, as an illustration of the utility of concrete as a substitute for iron, lamp-posts both for platform and yard were on view. In addition to articles mentioned above, exhibits included boundary posts, building blocks, cable boxes, cattle-pen posts, crank horse legs, culvert blocks and an inspection chamber to work into the culvert, door heads, jambs and thresholds, fencing of many descriptions, level crossing and other gate posts, glazing bars, kerbing and channelling, load gauge posts, notice posts, paving slabs, ridge tiles, signal wire pulley stakes, steps, a wicket, window heads and sills and window frames complete. The foregoing, though far from being a complete catalogue, is a typical list of uses to which concrete is being applied on the railway to-day, and

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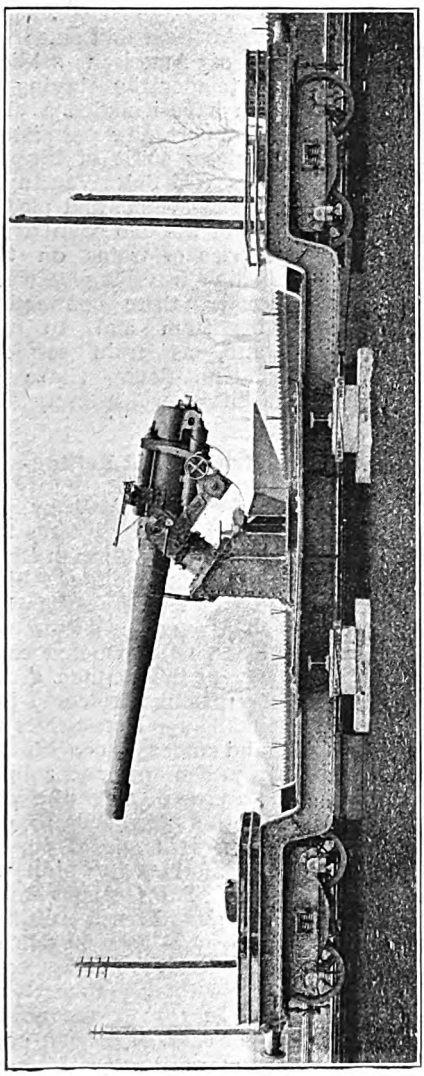
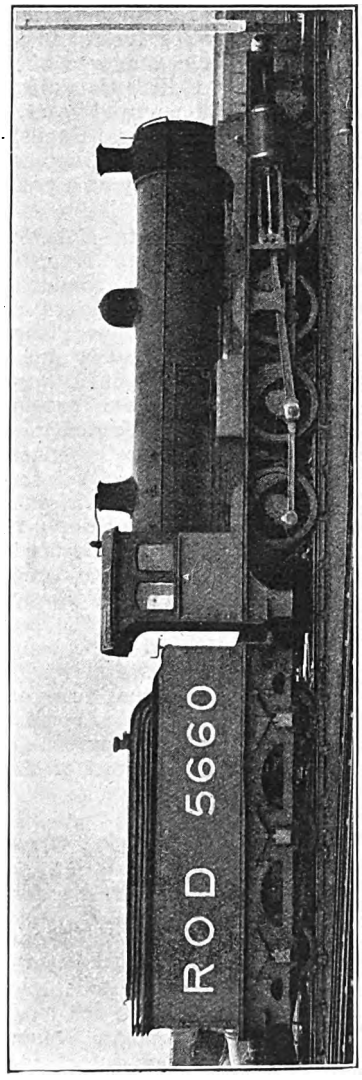
experience of its value, not as a mere temporary substitute for other material but as a constructional material in itself, points to the certainty that its employment will be extended in many new directions.



ANTI-AIRCRAFT GUN MOUNTED ON RAILWAY WAGON.



ONE OF THE 50 0-8-0 LOCOMOTIVES (CLASS T1) AS USED OVERSEAS.

North Eastern Railway Rolling Stock Adapted or Used for War Purposes.

North Eastern Railway Rolling Stock and the War.

REFERENCE has already been made to war work on this line, and by courtesy of the North Eastern Railway we now give further details, with two interesting illustrations of rolling-stock adapted or used for war purposes.

In September, 1914, a 54-ton trolley wagon was adapted to carry a 9·2 naval gun for coast defence, and was completed at Gateshead in 11 days after receipt of material. Of interest, also, was the construction of 12 pedestals, mountings, and training gear, and the erection of 6-in. naval guns on railway trucks for anti-aircraft purposes. A photograph of one of these mounted guns is reproduced. Forty 35-ton "Rectank" wagons designed for the conveyance of "tanks" were built. An early achievement at York was the building of a complete train of eight vehicles for the Director-General of Transportation, providing eating, sleeping, and office

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accommodation for the chief and his staff. Fifty 0-8-0 engines of class T1 were sent overseas. One of these, after return to England, is illustrated.

An Anglo-American Mecca.

REFERENCE was made in the June RAILWAY MAGAZINE to Sulgrave Manor, the ancestral home of the Washingtons. *The Daily Telegraph* is appealing for funds for the restoration of the old Manor House, purchased in 1914 by a British Committee in commemoration of one hundred years of peace between the world's two great English-speaking nations, and for the equipment and maintenance of the property as a great Anglo-American rendezvous.

Anything that contributes to a better understanding between the two branches of the Anglo-Saxon race must commend itself to all who have at heart a desire for the peace of the world, for on the excellence of Anglo-American relations so very much depends. For the promotion of a good understanding between the two nations there can be no better means adopted than the provision of a common meeting-place, where British and Americans can intermingle and come to understand each other in a way that no amount of newspaper or book reading could engender. Sulgrave Manor is an ideal spot for such an Anglo-Saxon Mecca. True, George Washington himself never lived in the Manor House, the last Washington to inhabit the old home being the American hero's great-great-grandfather, but the associations are there all the same, and while these make a great appeal to the American mind they should command the respect and interest of the native-born Briton.

To travel to Sulgrave Manor the Londoner may go from Marylebone by the Great Central Railway to Helmdon station on the main line, between London and Leicester, Nottingham, Sheffield and Manchester, and from many places, is most conveniently reached in that way. It is a pleasant walk through the leafy lanes of Northamptonshire from Helmdon to Sulgrave, or local conveyances can be utilised, and the Manor is at the further end of the picturesque village, with its old stone cottages and straggling streets, its village green and wayside forge, all in the olden style. Planned with some ambition, for the early Washingtons were a family of substance, the house is roughly in the form of a letter L. At the end of the older wing is a gabled porch, and the entrance to the hall has a Tudor arch under a square label, and in the two spandrils are the Washington arms carved in stone. The shield to the left is defaced, but that on the right is in perfect preservation, and exhibits clearly the mullets (or five-pointed stars) and bars, which George Washington retained in America as his family cipher, and from which, it is claimed, were evolved the stars and stripes of the "Star-spangled Banner." In pre-war days many were the pilgrims from across the Atlantic who made their way from Helmdon to Sulgrave; during the war and since the armistice numbers of American soldiers passing through or temporarily staying in the United Kingdom have included a visit whenever time and opportunity permitted, and with the still closer spirit of kinship which the war has created Sulgrave Manor will rank as a "tangible symbol and pledge of the historic unity of the two countries." Helmdon has a service of trains on the Great Central main line travelling between London and Leicester, there connecting with express trains from and to the northern towns and, as train services are improved, will no doubt share in the additional facilities which may be afforded.

Handing over Locomotives and Rolling-Stock.

OUR American contemporary *Railway and Locomotive Engineering*, gives interesting details of the handing over of German locomotives and rolling-stock to the Allied armies. "In the demand of the Allies for 5,000 locomotives and 150,000 cars from the crushed Huns, it must be remembered that in the terrific advance of the German army the invaders took everything they could lay their hands on, including 230 locomotives of the heavier type, and about 13,000 of the lighter type, besides 71,000 open and 20,000 covered cars. The Allies demand the delivery of 88,500 of the open and 40,000 covered cars and others of special types, besides the 5,000 locomotives to which we have already referred. The Germans took from the Belgians and French rolling-stock of a lighter type than those in use in Germany, the latter having freight cars usually of a much larger tonnage than those of their neighbours. In 1912 it was noted that only about 45 per cent. of Belgian cars possessed a tonnage capacity of 15 tons or more, whereas 85 per cent of German cars have this capacity. In the restitution, therefore, the Germans are justly called upon to give more than they got. It must also be remembered that a not inconsiderable proportion of the rolling-stock to be delivered was already in the hands of the Allies, as the Germans in their haste to get towards the Rhine left over 2,000 locomotives and nearly 100,000 cars in the districts since occupied by the Allied armies. Coblenz has so far,

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been the principal receiving station for the repairs and transfer of the locomotives, which are not only carefully inspected by the Allied authorities, but are given trial trips before being accepted. The same thorough inspection is made of the cars."

Sports Day at Wembley.

SPORTS Day at Wembley is always a great day in the annals of the London and North Western (London) Athletic Club; but the gathering on Saturday, June 14, was of special interest, in that it indicated the resumption of pre-war social activities and celebrated the conclusion of the war by a great Victory Pageant. This was the Twenty-seventh Summer Athletic Meeting, but during the war period the proceedings were necessarily shorn of much of their pre-war importance, and were continued mainly for the benefit of the children. The weather conditions were ideal, and there was a large assembly of members of the staff, relatives, friends and visitors. Many of the chief officers of the London and North Western Railway were present, including Mr. I. T. Williams, General Manager, accompanied by Mrs. I. T. Williams, who subsequently presented the valuable series of prizes to successful competitors in the various events; Mr. Howard Williams and Mrs. Howard Williams; Mr. C. F. Graseman, Chairman of the General Council of the Athletic Club; Mr. F. A. Sargent; Mr. G. N. Ford; Mr. J. C. Isaac, Chief Accountant; Mr. Bradford; Mr. E. C. Grindley, Indoor Assistant to the Superintendent of the line. Proceedings commenced with a series of events open to children of members of the staff. In the adult section the various events created great interest, and some fine performances were given. The judges for the ordinary events were Messrs. C. F. Graseman, E. C. Grindley, A. C. Harris, W. J. Harrison, J. Heeley, J. C. Isaac, C. F. Renwick, G. Smith, G. F. Tuley. For L.R.A.A. events the judges were Messrs. J. V. A. Kelly, H. B. Maslen, J. N. Anderson, S. C. Edwards, and E. V. Symons. The referees were Mr. E. J. Stansby and (for L.R.A.A.) Major J. H. Finlayson. Mr. G. R. Watson served as timekeeper, Mr. F. C. Pittam as starter, Mr. R. W. Hockley as telegraph steward. The Hon. General Secretaries (Messrs. T. Carter and D. H. F. Meacock) were kept very busy, and to their indefatigable energy was largely due the successful carrying out of the whole of the proceedings.

On the conclusion of the sports events, Mrs. I. T. Williams presented the prizes, which were of a valuable character, and well worth striving for, and all of the successful competitors received a hearty reception as they stepped forward to receive the rewards earned by them. On the conclusion of the distribution, Mr. Cecil F. Graseman thanked the General Manager, Mr. I. T. Williams, and Mrs. Williams for coming, and also Mr. and Mrs. Howard Williams. He also thanked them all for once again giving support to the old London and North Western Railway sports. During the war it had been merely a children's festival, but this year they had got back to their pre-war standard. Mr. I. T. Williams, who was received with much applause, in a brief speech expressed his appreciation of the kindly reception given to Mrs. Williams and himself. It had given them much pleasure to be present that afternoon. He also wished to thank the ladies for the extra services they had rendered during the war, and Mr. Arthur C. Chapman, who had devised and produced the Victory Pageant which followed.

This was splendidly rendered by members and friends of the London and North Western Railway (London) Athletic Club, Operatic and Dramatic Section. This has been devised and produced by Mr. Arthur C. Chapman, Stage Manager of the Operatic Section. The Assistant Stage Managers were Messrs. W. Johnson, F. Parkinson, S. Wallen and P. Wetherell. The music was arranged and directed by Mr. David J. Thomas (conductor of the operatic section), and played by a contingent of the Central London Orchestra.

There were twelve episodes, with a final procession of all taking part. In the first episode, "In 1914," four Belgian women in the fields are surprised by Uhlans and carried off to slavery. Belgium, in the person of Miss Marjorie Fraser, mourns her losses and calls upon the world for help. In the Second Episode the British Navy responds to the call. The spirit of Drake and Nelson still animates the Navy to-day. The Modern Navy was represented by six ladies in naval uniform, and six others, who cleverly danced a Sailor's Hornpipe. The Third Episode represented the gathering of the Allies: France, Japan, Italy, and America. All these ladies arrived preceded by a flag bearer and two supporters, the dresses being appropriate to the countries represented. They greeted Belgium and took their places on either side and behind her, as also in Episode Four, when the Colonies answer the call: Canada, Australia, New Zealand, South Africa, and India. In Episode Five, "A Relic of Mons," a trio of "Old Contemptibles" (Messrs. T. H. Green, F. Strange, and S. N. Spode) made their way into the ring, offering their services to the National Representatives.

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In Episode Six, "Hats Off to the Women," a detachment of women workers of the London and North Western Railway entered. In Episode Seven, "Oh, Hampstead! Happy, Happy Hampstead!!" four Cockney boys and their "donahs" trip the light fantastic toe on the greensward, when an interruption is made by Count Zeppelin's latest (and last), represented by a stage airship carried by two men, a Boy Scout holding the leading string! Boy Scouts then sounded the "All Clear," and the merry-making was resumed. In Episode Eight, "The Friends of the Wounded," a detachment of Orderlies and Nurses from the Marylebone Branch of the British Red Cross paraded. Episode Nine, "The Dance of the Years," was tastefully rendered, and in Episode Ten, representatives of Scotland, Ireland and Wales, with their flag bearers and supporters, were followed by Britannia, "The Patron Saint of the London and North Western Railway," in the person of Miss Ward. By this time most of the performers had taken their places upon a specially-erected stand, and in Episode 11 "Peace" (Miss Cissie Stoddart) entered with her four attendants, finally mounting to the top of the stand, where, appropriately grouped, the entire company sang, as Episode 12, Elgar's "Land of Hope and Glory."

The whole performance was well rendered and highly appreciated by all present. Great credit is due to all the performers, as also to Mr. Chapman and the others responsible for its preparation. The remainder of the evening was given over to dancing. The Central London Orchestral Society, under the direction of Mr. David J. Thomas, rendered musical selections throughout the proceedings and also for the dancing.

"Behind the Front in France."

LETTERS continue to arrive dealing with various aspects of railway working in France during the war period, detailing observations from many points of view, and a few extracts will be of interest. Mr. J. A. Baddeley writes:—

"In June, 1916, and for some time before and after, the military leave trains from the Northern sectors used to start from Poperinghe and Steenwerck respectively, being combined at Hazebrouck and running to Boulogne by way of Calais. I also remember in 1917, after we had taken over the St. Quentin sector from the French, the leave (and other) trains were run from Flavy-le-Martel (near Tergnier) to Boulogne *via* Amiens and Abbeville. After the Allied re-occupation of the Peronne district a standard gauge line, apparently constructed to carry all descriptions of traffic, was laid from Buire (near Albert) to Peronne, which considerably improved the railway facilities in that neighbourhood. In fact, Buire became an important junction having a large rest camp for troops adjoining it. This line, like many others, was sadly damaged in the evil days of 1918. Abbeville was an important railway centre, having a fairly large staff and several R.O.D. engines stationed there. Most of the trains from the north were run into the Abbeville Triage and reversed to continue their journey towards Le Treport-Mers, and a connecting line was constructed to obviate the necessity for proceeding to Le Treport and reversing, enabling the trains to continue direct to Abancourt. The Amiens-Abancourt-Rouen line was greatly used by military traffic, both Rouen and Havre being important British bases. The Havre traffic was not usually worked by Rouen but by Motteville, joining the Rouen line at Monterolier-Buchy. Supply trains for the extreme southern sector of the British line used to run from Romescamps by way of St. Omer-en-Chaussée, Beauvais Creil and Compiègne to the rail-heads at Noyon and Appilly (on the main St. Quentin line). The portion of the Paris-Lille line between Amiens and Arras was greatly used after the German retreat of 1917, two large rail-heads being at Achiet and Boisleux. The latter station was the radiating point of a system of Army light railways serving the sector south of Arras, and was used as a tranship point."

"Reader since 1908" mentions that the chief R.O.D. engines observed on the road nowadays are the 2-8-0's of Great Central design, built for the Government by various firms. "They are 'maids-of-all-work,' hauling enormously long troop trains to and from the Rhine, or running French civilian trains on the Nord. I travelled from Lille to Calais early last February behind one of these engines and we attained 40 m.p.h. at several places, particularly after passing Hazebrouck. Before the advent of this standard design, many were the types to be seen behind the lines in France. I had been in France more than a year before I saw an engine from my own particular line—the Brighton. One day at Canaples a troop train came along, headed by a Belgian State 0-6-0, and banked in the rear by a Billinton 0-6-2 tank. I afterwards found that these engines performed a great deal of banking duty on this particular section—the Amiens-St. Pol line. In fact, they seemed to be confined to it. The Caledonian Drummond 0-6-0's were also much in evidence there. Particular types of engines seemed to be confined to certain lines."

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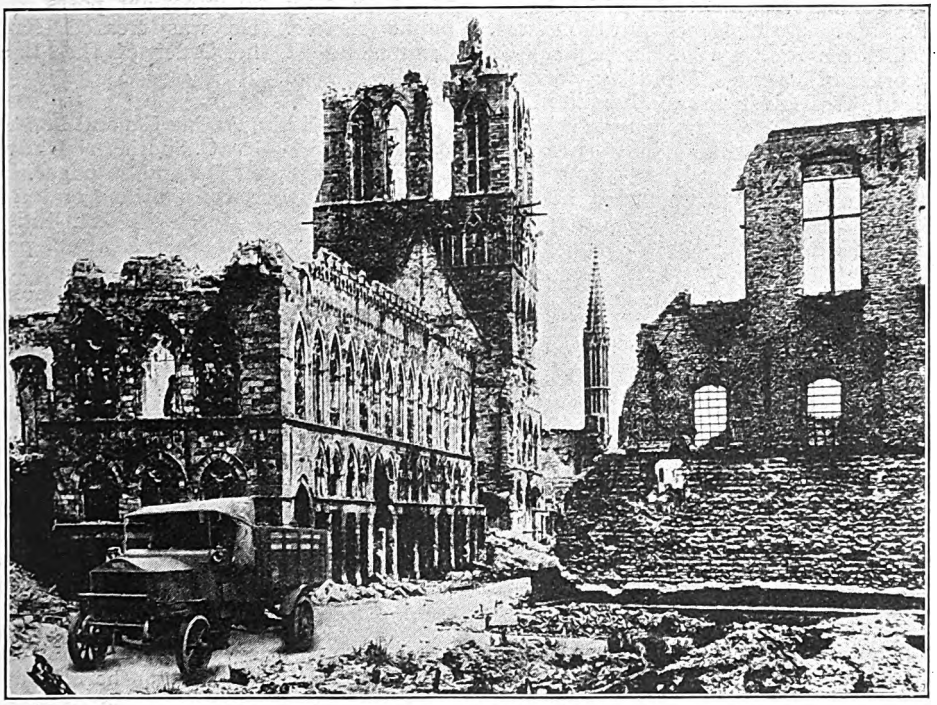
Railways and the Motor Car Industry.

Of the various methods of transport now working in conjunction with the railway industry there is no closer ally than that of road-motoring. With the post-war activities that may be expected to follow the formal declaration of peace there is little doubt but that British railway companies will avail themselves to a greater extent than heretofore of the facilitiesi offered by the road motor passenger car and the road motor goods lorry for the performance of necessary work in feeding the trunk railway lines of Great Britain with traffic.

As holiday traffic becomes heavier—and there is every prospect that this year will see it at its zenith—the possibilities of the motor char-a-banc as a means of enabling visitors to the great holiday resorts to see the surrounding country in ease and comfort will be more than ever apparent. Railway companies in pre-war days did much to develop road motor sight-seeing in various parts of the country, but there is much more to be done before the ground may be said to be fully covered. All the same it is generally considered that the day is not far distant when the railways will be among the largest motor car owners in the British Isles.

For goods traffic the motor lorry is an excellent jackal for the railway lion. The picture on this page depicts a Napier lorry standing by the ruins of the famous Cloth Hall at Ypres. Napier motor cars did excellent service in most of the war fronts, and Mr. H. T. Vane, the managing director of D. Napier & Sons, Limited, has much to be proud of in the performances of the Napier cars, which stood the severest tests for reliability and endurance.



A NAPIER MOTOR LORRY OUTSIDE THE RUINED CLOTH HALL AT YPRES.

As many Railway Magazine readers are aware, in East Africa numbers of Napier road motor lorries were converted to rail traction for military purposes, but it is as a feeder to the trunk railway lines that usefulness of the motor lorry is most apparent in railway circles in the homeland. For char-a-banc purposes it is claimed the Napier chassis is specially suited, as its spring and strength give easy and comfortable riding for the occupants.

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MR. CHARLES BENJAMIN COLLETT has been appointed Deputy Chief Mechanical Engineer, Great Western Railway. After pupilage at the works of Messrs. Maudslay, Son & Field, of Westminster and Lambeth, he entered Great Western Railway service as a draughtsman at Swindon in 1893, eventually rising to the post of Assistant Chief Draughtsman. In June, 1900, he was appointed Technical Inspector at Swindon Locomotive Works, and the following year became Assistant Works Manager, being appointed Locomotive Works Manager in January, 1913. The Swindon Works are collectively amongst the most extensive in the world, occupying an area of 265 acres, 62½ acres being roofed, and, in normal times, giving employment to upwards of 13,000 hands.

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SIR JOHN FIELD BEALE, K.B.E., Deputy-Chairman, Board of Directors, Midland Railway, is the son of the late Mr. J. S. Beale, who was for many years Solicitor to the company, and later a director from 1905 till his death in 1912. Sir John Beale was born in January, 1874, and was educated at Harrow and Trinity College, Cambridge, and rowed for his University in 1898. On the retirement in June, 1905, of the late Mr. J. S. Beale from the position of senior partner in the firm of Beale & Co., Solicitors to the Midland Railway, Sir John Beale succeeded to that position, and has from 1905 until recently acted as legal adviser to the company. During the past few years Sir John Beale has occupied with distinction and success several important posts in the public service. He was created Knight Commander of the Order of the British Empire in 1918.

Mr. C. B. COLLETT, O.B.E.
Deputy Chief Mechanical Engineer,
Great Western Railway.

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Mr. J. M. Eddy, Acting General Manager, Buenos Ayres Great Southern Railway, has been appointed General Manager. Mr. Eddy entered the service of the London and North Western Railway in 1898, and after a period of four years at headquarters was appointed Assistant Traffic Superintendent for the Lancaster Division. In 1904 he was appointed Assistant Rolling-Stock Superintendent, and in 1911 Rolling-Stock Superintendent. In 1912 he returned to headquarters to take over the position of Mineral Traffic Manager. In June, 1915, Mr. Eddy was appointed Assistant General Manager of the Buenos Ayres Great Southern Railway.

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SIR A. KAYE BUTTERWORTH, General Manager, North Eastern Railway, has been granted permission by the King to wear the Decoration of the Order of Leopold, conferred on him by the King of the Belgians "in recognition of valuable services rendered in the Allied cause." Similar permission has been accorded to the following in respect of the undermentioned Belgian Orders:—Mr. C. Busk, Continental Traffic Manager, Great Eastern Railway, Order of the Crown; Mr. G. B. Hayne, Assistant to General Manager, South Eastern and Chatham Railway, Order of the Crown; Mr. R. Cross, Stationmaster, Tilbury, Order of Leopold II.

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LONDON AND NORTH WESTERN RAILWAY changes include the following:—Mr. E. Wharton, District Goods Manager, Birmingham, appointed Mineral Traffic Manager, *vice* Mr. Howard Williams, C.B.E., who was recently appointed Assistant General Manager (for Staff); Mr. T. H. Shipley, District Goods Manager, Wolverhampton, appointed District Goods Manager at Birmingham in succession to Mr. Wharton; Mr. W. A. Thomas, appointed District Goods Manager at Wolverhampton.

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MR. F. C. A. COVENTRY, appointed Assistant Superintendent of the Line, Great Western Railway, was born in 1874, and was educated at Winchester. In 1893 he entered the Swindon Works as a pupil. After a period of work in the drawing office he was appointed an Inspector of Materials, and subsequently became Assistant to the Carriage Works Manager. In 1904 he was transferred to the Traffic Department, and engaged on road motor car work, which, as is well known, is a very important branch of the Great Western Railway's activities. In 1912 Mr. Coventry was transferred to Paddington as an Assistant to the Superintendent of the Line in charge of train working. At the end of 1915 his services were lent to the Ministry of Munitions. He worked in the Munitions Inland Transport Department as Deputy to Mr. Howard Williams, eventually succeeding him when Mr. Williams was transferred to the Coal Controller's Department.

Mr. F. C. A. COVENTRY, O.B.E.,
Assistant Superintendent of the Line, Great Western Railway.

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MR. E. C. SIMPKINS, who becomes Indoor Assistant to the Superintendent of the Line, Great Western Railway, entered the service in the Locomotive Accounts Office at Swindon in October, 1883. In the following year he removed to Bristol, and subsequently returned to Swindon, and spent seven years in the office of the Chief Mechanical Engineer. In August, 1891, he was transferred to the office of the Superintendent of the Line, and for some years was engaged in the Staff, Accident and Block Telegraph Sections of that office, and with the introduction of the railway signalling classes became one of its lecturers. In 1904 Mr. Simpkins was made personal clerk to the Assistant Superintendent of the Line, with special charge of agreements in which the company was interested and matters affecting joint working with other railways. Two years later, at the age of 36, he was appointed Chief Clerk to the Superintendent of the Line, which post he held until his recent appointment. For 13 years Mr. Simpkins acted as Secretary to the Great Western Superintendents' Conference.

Mr. E. C. SIMPKINS,
Indoor Assistant to the Superintendent of the Line, Great Western Railway.

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Other staff changes on the Great Western Railway include the following:—Mr. H. J

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Bolter, Divisional Superintendent, Pontypool Road, appointed Divisional Superintendent at Cardiff; Mr. J. Powell, Assistant Divisional Superintendent, Swansea, appointed Divisional Superintendent, Pontypool Road; Mr. G. W. Jenkins, Chief Clerk, District Goods Manager's Office, Birmingham, appointed Assistant District Goods Manager, Birmingham; Mr. J. C. Lloyd, Divisional Engineer, Neath, appointed Permanent Way Assistant Engineer, vice Mr. Lionel Wood; Mr. J. Cunningham, Chief Assistant, Divisional Engineer's Office, Newport, appointed Divisional Engineer, Neath; Mr. R. C. Sikes, Divisional Engineer, Shrewsbury, appointed Divisional Engineer, Wolverhampton, in succession to Mr. Dunsdon; Mr. R. Carpmael, Chief Assistant, Divisional Engineer's Office, Gloucester, appointed Divisional Engineer, Shrewsbury, in succession to Mr. Sikes.

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MR. H. J. BOLTER, who has been appointed Cardiff Divisional Superintendent of the Great Western Railway, was born in 1855, and joined the railway service as clerk at Chepstow in December, 1874. Since then his railway work has been mostly associated with South Wales, and the Cardiff division in particular, so that he goes to that division —probably the greatest revenue-producing division on the system—with a good knowledge of all its difficulties and intricacies. In 1875 he was removed from Chepstow to the Cardiff booking office, and in 1891 was appointed Stationmaster at Cardiff, being appointed Stationmaster at Tondu in 1898. In 1901 he returned to Cardiff as mineral agent, and in 1912 was appointed to his present position as Divisional Superintendent at Pontypool Road.

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MR. J. POWELL, who has been appointed Superintendent of the Pontypool Road Division, Great Western Railway, entered the service at Mountain Ash in 1873, and now becomes Superintendent of the Division in which he commenced his railway career. After gaining experience at several stations, where he was brought into touch with both passenger and goods departmental work, he was removed to the Divisional Superintendent's office at Chester in 1880. In 1882 he was appointed Chester City agent, and after occupying that position for a number of years he again returned to the Divisional Superintendent's office, being appointed senior clerk in 1894, and in 1905 he was appointed chief clerk to the late Mr. F Paxton, Divisional Superintendent. In May, 1914, Mr. Powell was appointed to the position of Assistant Divisional Superintendent at Swansea.

MR. JOHN MILLER, who has been appointed Chief Civil Engineer, Great Eastern Railway, joined the service in February, 1916, giving up an important position on the Pennsylvania Railroad in order to return to the United Kingdom. He is a native of Ireland, and was educated at Belfast University where he obtained distinction in Classics and Science and the Degree of Bachelor of Engineering. On the retirement of Mr. Horace Wilmer, C.E., in 1917, the General Manager received the additional appointment of Engineer-in-Chief, and recognising the conspicuous abilities of Mr. Miller, appointed him his Chief Assistant in the Civil Engineer's Department. The selection was a popular one, Mr. Miller from the outset having won the confidence of the staff by his sympathetic nature and the encouragement he gave them in their work and social aspirations. He is a sportsman through and through, and takes a keen interest in many athletic and social gatherings. He was recently elected by acclamation chairman of the Great Eastern Railway Athletic Association, in which capacity he has added to the large number of friends he had already made amongst the men and women of his own and other departments.

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LIEUTENANT-COLONEL J. G. BEHARRELL, D.S.O., formerly Assistant Goods Manager, North Eastern Railway, who has received the honour of knighthood, was in June, 1917, placed at the disposal of the Board of Admiralty by the Army Council to act as Director of Statistics in the Controller's Department of the Admiralty. He has also been the Statistical Authority at the Ministry of Munitions. Latterly he has been engaged on the staff of the Minister-Designate of Ways and Communications. He entered North Eastern service in 1888 as a junior clerk in the Secretary's Office, and at a comparatively early age was entrusted with important duties of a confidential character. In 1902 he was given a post in the General Manager's Office, where he had the advantage of three years' training under Sir George Gibb, and then went to the Goods Department to undertake special work in connection with goods rates. In 1907 he was promoted to be one of the Assistants to the Chief Goods Manager, and in that capacity frequently represented the company at the Railway Clearing House. In 1913 he was appointed Assistant Goods Manager. In 1915 he went with Sir Eric Geddes to the Ministry of Munitions, and in 1916 accompanied his chief to France as Assistant Director of Movements and Railways.

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MAJOR GILBERT SZLUMPER, London and South Western Railway, Secretary to the Railway Executive Committee, has been appointed Deputy Docks and Marine Manager, Southampton, and will act as general assistant to Mr. T. M. Williams. He is succeeded as Secretary to the Railway Executive Committee by Mr. G. H. Wheeler.

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MAJOR GILBERT S. SZLUMPER, A.M.Inst. C.E., is the only son of Mr. A. W. Szlumper, Chief Engineer, London and South Western Railway. Born in 1884 he was educated at King's College School and the Engineering

Major GILBERT S. SZLUMPER
Deputy Docks and Marine Manager, London & South Western Railway, late Secretary, Railway Executive Committee.

Faculty, King's College. He became associated with the London and South Western Railway in 1901. From that year to 1904 he had a varied indoor and outdoor experience, going through the drawing offices of the engineer's department at Waterloo, and being attached to one or other of the Permanent Way Superintendents. In 1904 Major Szlumper looked after the setting-out and construction of the light railway from Bentley to Bordon Camp; concurrently with this he supervised a considerable extension to the Government sidings at Aldershot. Together with Mr. H. I. Bond (now the London District Engineer) Major Szlumper in 1905 undertook the examination of and report upon the strength of cast-iron overbridges all over the railway in connection with the Motor Car Act. After this he acted for some time as Permanent Way Superintendent and—again with Mr. Bond—did all the Parliamentary work for the North Devon widening, a length of 18 miles. From September, 1906, to June, 1908, Major Szlumper had charge of the rather extensive alterations and reconstruction of Yeovil Junction Station, being Resident Engineer there. From June, 1908, to August, 1910, he was associated with Mr. P. St. J. Bishop (now the Central District Engineer) in alignment improvements, which covered the rectification and permanent marking of curves all over the system, and the introduction of scientific transition curves. From August, 1910, to May, 1913, Major Szlumper was Chief Assistant to the Central District Engineer at Eastleigh. From May, 1913, to February, 1914, he was in charge of the trackwork and cable laying of the suburban electrification, concurrently with the setting out and execution of the Hampton Court fly-over line. In February, 1914, Major Szlumper was appointed Assistant to the General Manager (Sir Herbert Walker) and acted as Secretary to the then secret Railway Executive Committee. From the outbreak of war until May 30, 1919, he devoted his whole time to the Secretaryship of the Railway Executive Committee, which he relinquished on June 1 in order to take up his new duties at Southampton. He has been a keen Territorial soldier for 18 years, and in recognition of this and his railway work was appointed Railway Transport Officer in 1914, being Senior R.T.O. of the Army; he was promoted to Major in 1916 in recognition of his services.

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AFTER 52½ years' service with the Great Northern Railway, Alderman Martin Cole, District Locomotive Superintendent in Charge at Doncaster, is retiring. Mr. Cole joined the Great Northern Railway at Grantham in December, 1866, starting as office boy in the District Locomotive Superintendent's office under Mr. H. Allen, at that time attached to the Peterborough district. Mr. Cole stayed in the office for about two years, and then went into the running shed as an engineering apprentice, in 1870 going to Doncaster to complete his training in the Plant Works. When 23 years of age he was sent to Lincoln as fitter-in-charge at the Great Northern Locomotive Depôt, and stayed there for eight years, when he was promoted to take charge of the Leicester locomotive district, formed on the opening of the Great Northern line to Leicester. Mr. Cole remained at Leicester for only six months, being then appointed by the late Mr. P. Stirling to succeed the late Mr. E. Drage as Lincoln District Locomotive

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Superintendent; this post being held for 15 years. In 1898 he was appointed by Mr. H. A. Ivatt to take charge of the Doncaster locomotive district, retaining Lincoln as a sub-district, and this position Mr. Cole has now held for the last 21 years. His total record of service is 52½ years, serving under four locomotive superintendents: the late Mr. Archibald Sturrock, the late Mr. Patrick Stirling, Mr. H. A. Ivatt, and the present Locomotive Engineer, Mr. H. N. Gresley. During this long service Mr. Cole has had much experience, and has always maintained the most courteous relations with the officials of all departments, while endeavouring to be considerate to those employed under him consistent with due regard to the interests of the Great Northern Railway Company. Mr. Cole some years ago was appointed to the Doncaster Corporation and is now a member of the Aldermanic bench.

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CAPTAIN NASH, who was awarded the O.B.E. for his services during the war, has been appointed by the London and North Western Railway as Superintendent of the Marine Department at Holyhead.

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RECENT railway obituary includes the name of Mr. Alfred Sire, for many years London representative of the Northern Railway of France. He had resided in this country since 1876, when he was appointed Continental Traffic Superintendent of the General Steam Navigation Company. In 1884 he took up the position with which he was best known. His son, Mr. H. A. Sire, is Goods Manager, London, Brighton and South Coast Railway.

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WITH great regret we record the death, at the age of 68 years, of Mr. C. W. Bartholomew, of Blakesley Hall, Northamptonshire. Mr. Bartholomew had been for many years a vice-president of the Railway Club, and he was the owner of the very useful 15-in. gauge railway which runs from Blakesley station, on the Stratford-upon-Avon and Midland Junction Railway to Blakesley Hall, and serves the Blakesley estate. On several occasions the deceased gentleman, who was a civil engineer and colliery owner, entertained the members of the Railway Club at Blakesley Hall, and on page 316 of the RAILWAY MAGAZINE, May, 1919, published a few days before Mr. Bartholomew's death, there appeared a reproduction of one of Mr. W. J. Bell's photographs illustrating one of these visits, and depicting a 15-in. gauge train, headed by Mr. Bartholomew's 4-4-4 type petrol-driven tank locomotive.

WE regret to announce the death of Mr. C. E. Dewey, Freight Traffic Manager, Grand Trunk Railway, Montreal. He was one of the most popular railway officials in Canada.

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DEATH of Mr. William Edward Adie, a former well-known officer of the Midland Railway, is also announced. He was Chief Goods Manager from April, 1891, to February, 1905, when he retired after half a century of railway service.

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MR. EDWARD G. A. GOBERT, B.Sc., known to early readers of the RAILWAY MAGAZINE as "Mernok," and whose death occurred recently at Ilford, was born at Abbeville, France, in 1857. He was first educated at the College Stanislas and subsequently attended the College Chaptal and obtained his degree at the early age of 17. He came to England in 1878 and speedily became known as a technical writer in engineering and scientific journals under the pseudonym of "Mernok," his speciality being locomotive engineering. For many years he was technical adviser to leading firms of patent agents at home and abroad, and was latterly employed in the service of the War Office. A man of considerable erudition and a linguist of no mean order, his loss will be regretted by a large circle.

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MR. ALFRED ASLETT, formerly Secretary and General Manager, Furness Railway, was presented recently by friends and many Barrow shipping and trading concerns with a silver King's pottery canteen, containing 150 pieces. The presentation was made at the Barrow Town Hall by the Mayor (Alderman A. Barrow), who referred to Mr. Aslett's business enterprise in opening out travelling facilities in Lakeland. The gathering that day had to do with the personal friends of Mr. Aslett and the traders of Barrow, with whom he had been associated for the past 24 years. They all recognised Mr. Aslett's very many and great qualities, his great desire to render service to the district. Mr. Aslett replied that to him the presentation showed their respect and appreciation on his retirement from the Furness Railway as secretary and general manager. In reference to the steamer services that used to run from Barrow, he said that they had done their best to retain the Isle of Man and Belfast steamers, but they had gone to Heysham. With regard to the Fleetwood boats, it was unfortunately a fact that the Furness Railway Company were selling their passenger steamers. For this he was very sorry indeed, for he had looked upon that service

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as the beginning of great things in the way of passenger traffic. It had brought large numbers of people to the district. In 1900 the steamers carried 25,000 passengers, and in 1913 no less than 200,000 passengers had been carried, and the receipts were £10,000. However, it was not for him to criticise the policy of the directors, but it seemed almost incredible to him that they had decided to relinquish a service that was promising so well. Dealing with his life as a railwayman, Mr. Aslett said he had first been associated with the railway world in 1862, when he commenced as a junior clerk with the Great Northern in the Nottingham goods depôt. By steady steps he had risen, and in 1891 was made Manager of the Cambrian Railway, and in 1895 was appointed General Manager of the Furness Railway, in succession to Sir James Ramsden. It had been a great compliment to him when Sir Charles Scotter, Chairman of the London and South Western Railway and Sir James Thompson, Chairman of the Caledonian Railway, had, when asked by the Duke of Devonshire to nominate someone to follow Sir James Ramsden, both put him at the head of their list when requested to put down three names to be selected from. His association with the Furness Railway and the Furness district had continued until 1918, when, at his own desire, he retired from railway service, after 56 years of continuous work and responsibility. Whatever the result of his efforts to promote the best interests of the traders and the public, and also that of the Furness Railway and the Barrow docks and channel may have been —and every possible assistance had been given to the naval and military authorities during the war—he could certainly say that no human being could have worked harder or with a keener desire to benefit the Furness Railway, its harbour and the town, as well as North Lonsdale and Whitehaven.

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MR. PHILIP WHYSALL, Signal Engineer, Metropolitan District and Allied Tube Railways, was recently the recipient of a gold repeater watch presented by the staff of the engineering—civil, mechanical and power—departments of the service which he is now leaving. In the unavoidable absence of Mr. Z. E. Knapp, Manager for Maintenance and Construction, Mr. Arthur R. Cooper, Civil Engineer, presided, and was supported by Mr. McCallum, representing the Mechanical Engineer, and Mr. P. V. McMahon, Superintendent of Power. It may be added that before Mr. Whysall became the Signal Engineer he was with the McKenzie, Holland and Westinghouse Power Signal Company, engaged upon the installation of automatic signalling on the District and Tube Railways. He now returns to construction work with the same firm, where his unique experience and ability will be of service in the developments in signalling that are sure to come.

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THE annual dinner of the Engineer and Railway Staff Corps, R.E. (T.F.) was held recently at the Grosvenor Hotel, Commandant Lieut.-Colonel Sir William Forbes in the Chair. There were also present: Major-General Sir Henry Thornton, K.B.E.; *Colonels*: Sir R. Elliott-Cooper and Baggallay; *Lieut.-Colonels*: Sir J. A. F. Aspinall, Sir Sam Fay, Cooper, Dent, Hawkshaw, Worthington, Sir M. Fitzmaurice, Wilson, Sir F. H. Dent, Sir H. A. Walker, Morgan, Trench, Calder, Watson, Palmer, Williamson, Sir W. H. Ellis, Morris, Ross, Hyde. *Majors*: Sir E. D. Jones, Scott, Grinling, Clow, Paterson, Aldington, Cox, Grierson, Brown, A. W. Szlumper, Horne, Fraser, McAlpine, Burt, Kirkpatrick, Cooke, Sir H. Fowler, G. S. Szlumper, Maunsell, Humphreys, Stemp and Hon. Sec. R. A. Bacon. Guests included: *Lieut.-Generals* Sir G. M. W. Macdonogh, Sir T. E. Clarke, Commodore Sinclair; *Major-Generals* The Hon. R. Stuart-Wortley, Sir W. T. Furse, Feilding, Sir P. A. Nash, Crookshank, Twining; *Brigadier-Generals* Mance, Walker, Sir R. H. Brade; *Colonels* Pringle, Micklem, Redman, Von Donop, Major R. Micklem, and Mr. E. J. Foley.

* * *

THE annual meeting of the Railway Benevolent Institution was held at Paddington Station on Friday, June 20, the chair being occupied by the President, Major David Davies, M.P., Chairman, Cambrian Railways Company, and Deputy-Chairman, Barry Railway Company. The Chairman of the Board of Management of the Institution, Mr. Edward Watkin, General Manager, Hull and Barnsley Railway, was also preesnt.

* * *

THE London and South Western Railway Musical Society has now given over 100 concerts. A commencement was made in November, 1914, by giving concerts to soldiers in training; later on their efforts were principally devoted to entertaining the wounded. To mark the occasion of the centenary which took place at Oatlands Park Convalescent Camp, a presentation was made to each of the four lady artistes performing that evening. A marked feature of these entertainments has been the appreciation shown towards the male voice part songs. This choir, under the direction of

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Mr. C. J. Hooker, was at one time 50 strong, but on occasion has dwindled down to a double quartette. It is estimated that over 100,000 wounded, &c., have been entertained, and over £500 has been raised on behalf of charities connected with and arising out of the war. The society wound up their season by giving a fine show to about 600 wounded at the County of London War Hospital, Horton.

* * *

RECENT visits by the Great Eastern Railway Musical Society under Colonel W. Johnson Galloway include one by the orchestra to Woodcote Park Camp, Epsom, and to St. Dunstan's Hostel for Blinded Soldiers and Sailors, when much the same programme as at Woodcote Park was performed.

* * *

During the war sixty members of the staff of the Stratford-upon-Avon and Midland Junction Railway joined the Forces, and seven were killed. One of the latter, Private F. C. Lloyd, of the Royal Warwickshire Regiment, was awarded the Military Medal and the Croix de Guerre. The company has produced a roll of honour of a non-conventional type. Printed in red and black it is from a design by the well-known artist, Mr. Harry Furniss. Beneath the heading, which consists of the company's title, is a seated figure of Shakespeare with two female attendants emblematic of peace and war. Below the list of names is a representation of a S.M.J. locomotive with a large figure of a railway pointsman on one side and a returning wounded rifleman on the other. At the sides of the roll are characteristic sketches illustrating Stratford-upon-Avon, Warwick Castle, Shakespeare's house, Sulgrave Manor—the ancestral home of George Washington—and a portrait of America's first president. The roll is signed by Mr. A. E. Diggins, the railway's secretary and general manager, and in more respects than one it forms a record of which the shareholders and staff of the S.M.J. line may well be proud.

* * *

FOUR great memorial services were held on May 10, 1919, in honour of North Eastern Railway men who have lost their lives in the service of their country. The services took place at York Minster, Newcastle Cathedral, Holy Trinity Church, Hull, and St. Mary's Church, Gateshead. Relatives of the fallen men received individual invitations to the services, and all members of the company's staff were given tickets of admission on application. Special trains were run to the centres, and ordinary trains were strengthened. At York Minster the address was delivered by the Lord Archbishop. Before the service an appropriate selection of music was rendered by the York Railwaymen's Silver Band. At Newcastle and Hull the services were conducted by the Lord Bishops of these places, and at Gateshead by the Rector (the Rev. H. S. Stephenson).

* * *

AT Canterbury Cathedral, on Friday May 30, a memorial service was held for the 493 members of the staff of the South Eastern and Chatham Railway who fell in action or died from wounds in the great war. Special arrangements had been made by the railway to make the service as representative as possible. The congregation included Mr. H. Cosmo Bonsor and his colleagues of the board, Sir Francis Dent, General Manager, and many leading officers of the railway, representatives of the Board of Trade, the Director of Movements, the naval forces at Dover and Folkestone, the Mayor of Canterbury and others.

* * *

AT the invitation of the Mayor (Mr. C. J. Bowen Cooke) a memorial service for fallen railwaymen and men of the borough of Crewe and district was held at Christ Church, Crewe. The sermon was preached by the Right Rev. John Edward Mercer, D.D. (Canon of Chester Cathedral, Bishop of Tasmania, 1902–14), who stated that the total honour roll of the railway was 31,742, or 34 per cent. of the whole staff. In Crewe the number of those who joined the Forces—so far as they had been able to obtain the figures—was 3,201, of whom 282 were killed or died on active service.

* * *

IN a letter recently circulated the committee governing the Westinghouse War Relief Fund express their great appreciation and thanks to all contributors for the voluntary support given throughout the period of the war. Up to the end of December, 1918, nearly £66,000 had been subscribed approximately two-thirds by the employees and one-third by the company. The period of regular contribution from wage or salary is now about to finish and it is satisfactory to learn that a balance remains sufficient to cover for a period of at least 10 years the relief of the disabled and the dependents of those who have made the supreme sacrifice. There are 207 relatives and 382 children of deceased workers, in addition to many disabled soldiers and sailors for whom responsibility has been incurred.

* * *

AN intellectual treat of no mean order was enjoyed by the members of the Railway

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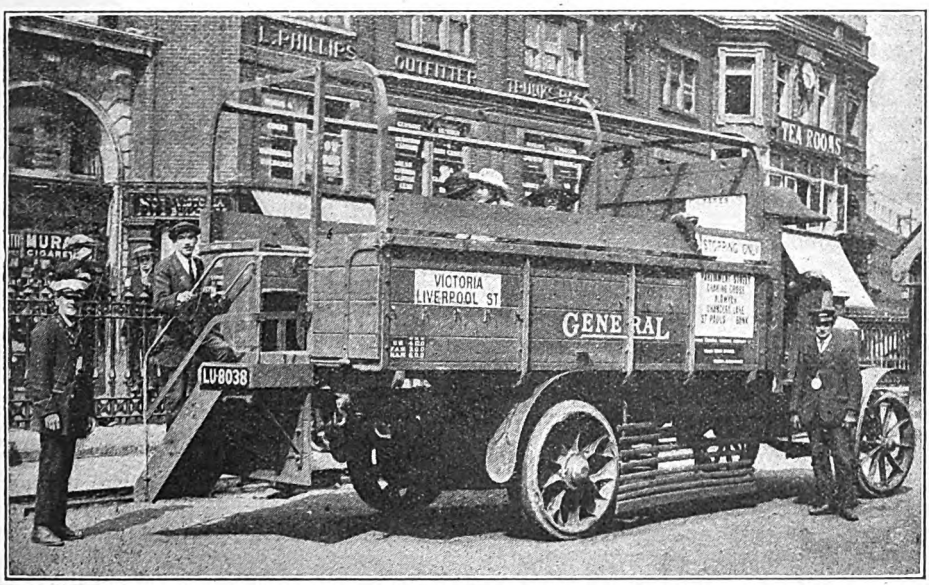
Club, 92, Victoria Street, S.W., at the June General Meeting. Mr. W. Parker presided. The feature of the evening was a lecture by Mr. W. J. Scott, B.A. entitled "Train Services in 1852." It is doubtful whether there is, or ever has been, a compeer to Mr. Scott in the endowment of the dry bones of railway history with animation and attractive vitality. Without referring to a note for upwards of an hour Mr. Scott kept his audience entranced as they in imagination followed him through a marvellous maze of railway journeyings as they were performed in 1852 by routes in many cases widely different to those of to-day. Travel in Mr. Scott's company is never dull, and he enlivened his verbal railway trips and time-table explanations with many a humorous aside, anecdotal "by the way," and subtle story. At the close of the lecture Mr. Scott was cordially commended by Messrs. Burley, Gairns, Hopwood and other members of the Club, and the vote of thanks proposed by the Chairman was seconded by Mr. Ford-Stevens.

* * *

Two interesting posters by the London Safety First Council, 31, Westminster Broadway, S.W.1, have been issued, and as usual they are distinctive and topical. In one, the "A.B.C. of 'Safety First,'" a child on a scooter is crossing in face of a motor lorry, to the consternation of the nurse; but lorry driver and a policeman are on the alert. The legend is "Always be careful." The other consists of "Reminders to drivers of steam vehicles." The text is partly on technical details; otherwise advocating safety methods in traffic. Six photographic reproductions illustrate injunctions.

* * *

THE directors of the Great Southern of Spain Railway, in their latest annual report, state that they desire to express their "cordial acknowledgments of the services rendered in circumstances of exceptional difficulty by the General Manager (Mr. George L. Boag), Secretary (Mr. A. F. Judd), officers and staff, and of the continued goodwill of the men engaged in carrying on the railway and shipping operations of the company."



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* * *

NOTTING HILL and Ladbroke Grove Station, Metropolitan and Great Western Joint Line, is now known as Ladbroke Grove, the station name boards reading "Ladbroke Grove (North Kensington)."

* * *

MANY important improvements in South Eastern & Chatham Railway main-line services came into force on Monday, June 16, and the following principal items may be noted. All are new except those marked by an asterisk. Week-days.—9.10 a.m. fast Victoria to Margate, Broadstairs and Ramsgate, with slip portion for Whitstable and Herne Bay, &c. (due Margate

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10.40). 10 a.m. fast Charing Cross to Folkestone, with slip portion for Deal and connection to Hythe and Sandgate. 10.15 a.m. fast Victoria to Margate, Broadstairs and Ramsgate (due Margate 11.45). 10.33 a.m. fast East Croydon to Folkestone and Margate, with connections from Reading, Aldershot and Guildford. 11 a.m. fast Charing Cross to Hythe, Sandgate and Folkestone. 11.30 a.m. fast Victoria to Whitstable and Kent Coast stations to Ramsgate. 1.10 p.m. S.O. Victoria to Margate, Broadstairs and Ramsgate. 1.30 p.m. fast Charing Cross to Folkestone, with slip portion for Shorncliffe, Hythe, Sandgate, &c. *1.30 p.m. S.O. Victoria to Dover expedited, with fast portion for Deal. 2 p.m. fast Victoria to Westgate, Margate, Broadstairs and Ramsgate Harbour, with slip portion (N.S.) for Deal). *3 p.m. Charing Cross to Folkestone expedited, with slip portion for Deal. 3.15 p.m. fast Victoria to Margate, Broadstairs and Ramsgate. 3.40 p.m. fast Charing Cross to St. Leonards and Hastings. 4 p.m. fast Charing Cross to Folkestone Central. 4.40 p.m. fast Charing Cross to Bexhill. 5.5. p.m. Holborn Viaduct to Margate West, Broadstairs and Ramsgate. 7 p.m. Charing Cross to Folkestone. 7 p.m. Victoria to Whitstable, Herne Bay, Westgate, Margate, Broadstairs and Ramsgate. 7.30 p.m. Charing Cross to Hastings and Bexhill. 9.30 p.m. Charing Cross to Hastings. 8.25 p.m. Victoria to Margate, Dover, &c. 7.40 a.m. Hastings to Cannon Street (9.15). 7.45 a.m. (Mondays only Deal, and 7.35 a.m. Walmer to Cannon Street (arr. 10.5 a.m.). 7.10 a.m. Ramsgate Harbour to Cannon Street. 8.5 a.m. (N.S.) Folkestone Central to Cannon Street (9.35). 8.45 a.m. Ramsgate Harbour to Victoria. 9.30 a.m. Folkestone Central to Charing Cross. 11 a.m. Folkestone Central to Charing Cross. 11 a.m. Ramsgate Harbour to Victoria. 1 p.m. Ramsgate Harbour to Victoria (with 1.0 Deal connection). 2 p.m. Ramsgate Harbour to Victoria. 2.30 p.m. Folkestone Central to Charing Cross. 3 p.m. Ramsgate Harbour to Victoria. 4 p.m. Ramsgate Harbour to Victoria 4 · p.m. Folkestone Central to East Croydon, Reading, &c. 5 p.m. Folkestone Central to Charing Cross. 5.50 p.m. Ramsgate Harbour to Victoria. 7.25 p.m. Folkestone Central to Charing Cross (with 6.30 Deal connection). 8.30 p.m. Folkestone Central to Charing Cross. Sundays.—8.30 a.m. Victoria to Margate, &c., and 10.15 a.m. Victoria to Margate, &c., 7 p.m. and 9 p.m. return. 9.20 a.m. and 11 a.m. Charing Cross to Hastings. 5 p.m. and 8 p.m. return. 10 a.m. Charing Cross to Folkestone Harbour. 4.45 p.m. Folkestone Harbour to Charing Cross.

PULLMAN cars, hitherto confined to the continental trains, are now operated by the South Eastern and Chatham Railway on several Kent Coast expresses. Between London and Margate and Ramsgate they are provided on the 11.30 a.m. and 7 p.m. down trains from Victoria, and by the 7.45 a.m. from Ramsgate Harbour to Cannon Street, and the 3 p.m. from Ramsgate Harbour to Victoria. On the Folkestone route the Pullman trains are the 11 a.m. and 7 p.m. from Charing Cross, returning at 7.55 a.m. (N.S.) or 8.15 a.m. (S. only) from Folkestone Junction to Cannon Street, and 4.50 p.m. to Charing Cross. The cars are available for holders of first-class tickets on payment of a supplement of 2s. Meals and refreshments are obtainable on the cars.

* * *

"THE Fairbourne Miniature Railway," which has been closed down during the war, opened at Whitsuntide this year and record crowds were carried. This railway, which runs from Fairbourne Station (Cambrian Railway) to the Barmouth Ferry at Penrhyn Point, is well-known to visitors to Barmouth and district. It is 1¾ miles long, and was previously worked by horse traction. The "Atlantic" type engine *Prince Edward of Wales* has been thoroughly overhauled by the makers, Messrs. Bassett-Lowke, Ltd., Northampton, and is now working the railway. It is painted in standard Great Western Railway colours.

* * *

THE Canadian Pacific Railway inaugurated on June 1 a faster daily express sleeping car service between Montreal and Vancouver and *vice versa*, connecting at Montreal with steamships of all lines. Called the "Trans-Canada Limited" these express trains make the 3,000 miles run from Montreal to Vancouver in 93½ hours and the return journey in 92¼ hours, compared with an 110 hour journey, the time taken by the Canadian Pacific "Imperial Limited." There are 30 stops on the journey, including Ottawa, Fort William, Winnipeg, Calgary, whilst connection is made at Sudbury with Toronto. Rolling stock for the "Trans-Canada" service is valued at upwards of $6,000,000, and includes 59 sleeping-cars, 24 locomotives, 15 dining-cars, 12 observation-cars, 12 baggage-cars, 5 compartment-cars, &c.

* * *

Amongst the letters carried on the Vickers-Vimy aeroplane by the intrepid airmen, Captain Alcock and Lieutenant Whitten Brown, was one written by Mr. E. W. Beatty, President of the Canadian Pacific Railway, to Sir George McLaren Brown, K.B.E., European General Manager.

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Frontispiece: London & South Western Railway Train.
Midland Railway Locomotive History.
Methil Docks—North British Railway.

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SAM FAY, *General Manager.*

Gold Medal Franco-British Exhibition, 1908.

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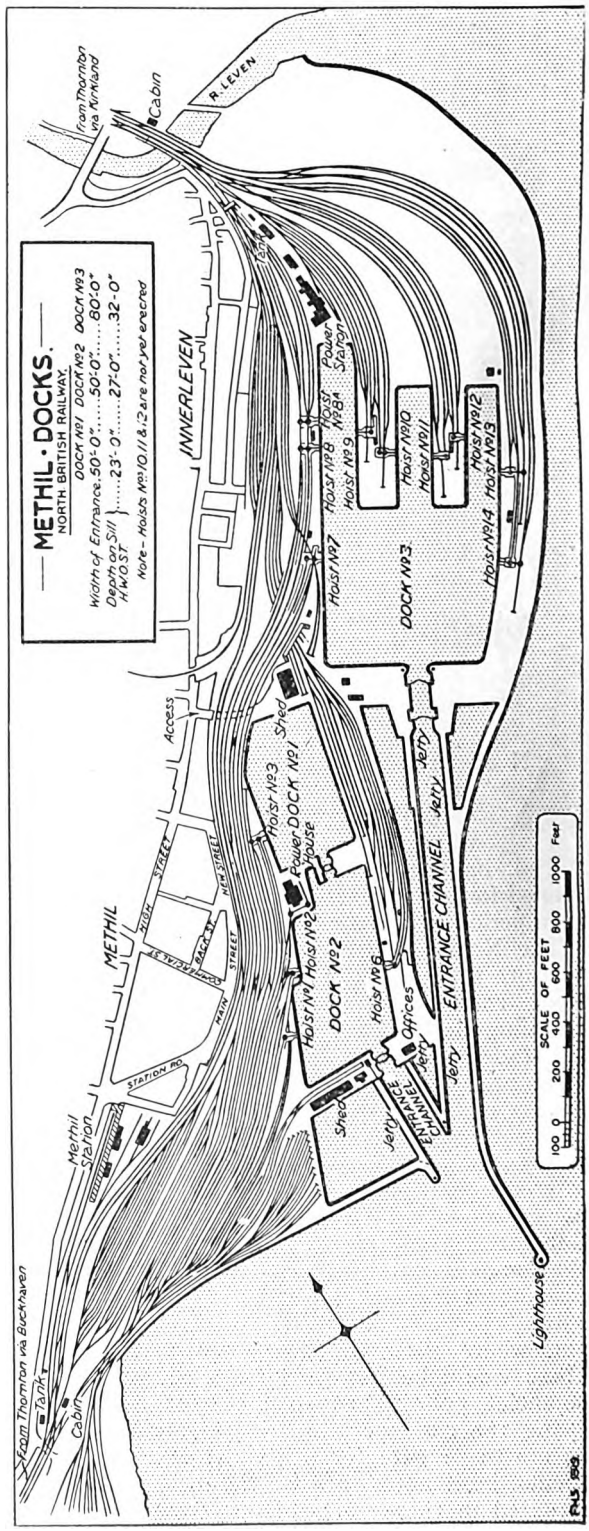
The principal coalfields served by the North British Railway are situated in Lanarkshire, and, as already noted, in Fifeshire and the Lothians. So far as Lanarkshire is concerned, all the coal-bearing areas have now been leased, and the whole field has for a long time been worked to almost its full capacity. The result is that the thicker and more remunerative seams are fast becoming exhausted, and, within recent years, quite a number of pits have been closed down, the minerals having been worked out. The probability is that the output of the county may before long show a marked decrease, and this especially so far as the output of export coal is concerned, owing to the increased cost of production through the working of the thinner seams. On the other hand, the output of the East of Scotland coalfields is going up by leaps and bounds, and the prospects for the future are of the brightest. During the 10 years ending 1913, while the annual output of Lanarkshire increased by ·8 per cent. and the Lothians by 71 per cent., Fifeshire improved to the extent of 52 per cent.* It is to cope with the great development in Fifeshire that the immense dock scheme was carried out at Methil. The Fifeshire coalfield, as differing from that of Lanarkshire, is only now being opened up, and during the more recent years mining operations in the county have been greatly extended, tapping a large number of new and valuable seams. The "Kingdom" has all along been famous for its rich coal deposits. After making allowance for the tonnage raised since the Royal Commission on Coal Supplies in 1903–5 estimated the total quantity of available coal in seams of 24 in. in thickness and upwards still to be worked in this area at 3,029, 922,435 tons, there remained sufficient to maintain the



* In the same period the total Scottish output improved by 21 per cent.

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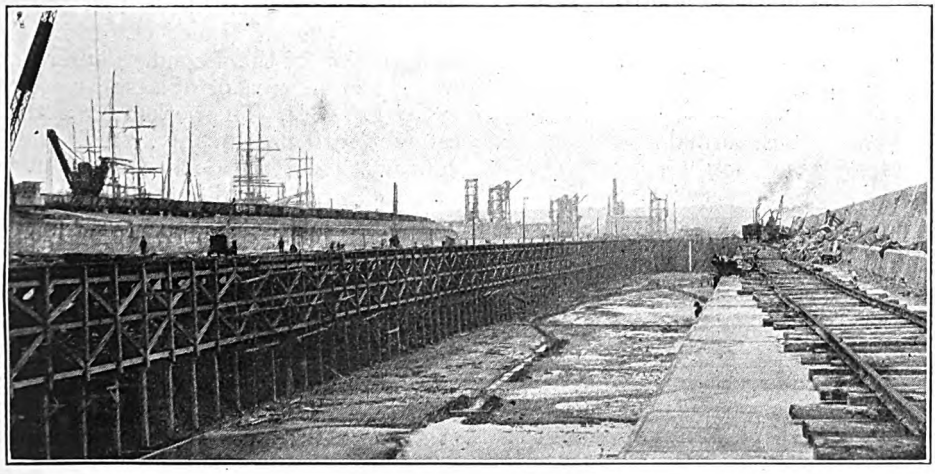
existing output for another 300 years. At present extensive coal workings from Fife are carried under the bed of the Firth of Forth, and if two-thirds of the under-sea coalfield, extending to 130 acres, which will be worked from the north side of the Forth, be included in the estimate of available coal, the 1913 rate of output would be continued for upwards of 600 years. By the expiry of that period, however, new methods may be devised for getting coal at greater depths than is now possible, although with the rapid strides science is making there is every likelihood that by that time a substitute for this form of fuel will have been discovered.

largest tonnages under these yearly contracts prior to the war were exported to Hamburg and Copenhagen, and in connection with this trade an arrangement was in operation whereby regular coal trading vessels obtained special berthing facilities at Methil Dock so long as they ran regularly and exclusively between Methil and one of the ports specified in the arrangement for a period of at least nine months in the year ending December 31. These vessels, with an average carrying capacity of about 3,000 tons, returned to Methil in ballast after discharging their coal cargoes, and the special facilities which were granted to them were of considerable benefit to the



METHIL NEW DOCK.

It has already been seen that the exhaustion of the Lanarkshire Field is having the effect of throwing on to the East of Scotland the burden of supplying the steadily-increasing demands of the coal trade of the country, and this accounts in a large measure for the abnormal development of Fifeshire. The explanation of the great bulk of the increased tonnage raised, however, must undoubtedly be put down to the rapidly-growing demands of foreign countries for Scotch coals. As will be readily understood in connection with the immense foreign demands which have now for many years been made upon the Fifeshire coal trade, a large fleet of steamers is employed continuously in the transport of the fuel to the principal markets. The trade. A very important and valuable trade has all along been carried on in the export of coal from Methil to London for the public utility companies of the City, and the regular steamers which convey the traffic also enjoy special privileges for loading at the port.

Methil is now without doubt the most important "coal" port in Scotland, and the export tonnage dealt with in 1913—the last pre-war year—constituted a record. Under-noted are particulars of the coal shipped at the port during 10 years to 1913:—

Coal Shipped.

	Tons.
1904	1,985,826
1905	2,423,372
1906	2,793,257

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	Tons.
1907	2,823,720
1908	2,559,500
1909	2,691,109
1910	2,926,210
1911	3,012,440
1912	2,557,245
1913	3,224,299

The exports other than coal in peace times were negligible, representing only a little over 1,000 tons per annum. While the principal trade of the port has all along consisted of exports, Methil had also a rapidly-growing import traffic, which, as will be seen from the following figures for 1913, was of considerable value :—

Imports, 1913.

	Tons.
Pit props, sleepers and battens	49,092
Esparto	7,631
Wood pulp	7,671
Miscellaneous	19,027
	83,421

No doubt when normal conditions, as the result of peace, are again established this trade will be very soon revived.

Ample shed and warehousing accommodation is set apart for import traffic, and the most up-to-date facilities are provided to ensure prompt despatch in the handling of it.

Prior to 1887, when the output of coal in Fifeshire was only about 2,000,000 tons per annum, and the total shipments at the principal ports represented just about 50 per cent. of that figure, Methil was a place of comparatively little importance. At that time the greater portion of the export coal was dealt with at Burntisland, Dysart, Charlestown and Wemyss. The future possibilities of Methil and Fifeshire were recognised at an early date by the late Captain Randolph Gordon Wemyss, of Wemyss Castle, who, on his coming of age in 1879, obtained Parliamentary powers for the construction of a railway from a junction with the North British Railway's main line at Thornton to Buckhaven on the coast. This line was opened for traffic in August, 1881. Shortly afterwards Captain Wemyss had it extended to Methil, where, on arranging satisfactory guarantees with his tenants as to annual shipments of coal at the port, he took in hand the construction of the first wet dock at the place. This was completed and brought into use on May 5, 1887, and in January, 1889, both the railway and dock undertakings were acquired by the North British Railway at a cost of about £227,000. This dock has an area of 4¾ acres.

In almost every case where an important shipping port has been taken over by a railway company, the effect has been to materially stimulate and revive trade, and this was so apparent at Methil that within a few years after the dock undertaking had been acquired by the North British Railway, the export trade more than doubled, and the accommodation became inadequate for the traffic. Steps were then taken to secure Parliamentary powers for the construction of a second dock, and the necessary authority was obtained by the North British Railway in their Act of June 11, 1891. The construction of the second or outer dock, which has an area of 6½ acres, was commenced in 1894. The works were partially brought into use in July, 1897, and by January, 1900, the dock was completed. The capital involved in the construction of this dock was approximately £360,000, and the work was carried out by Sir John Jackson.

Notwithstanding the greatly-increased berthage provided by the opening of the second dock, the annual tonnages dealt with continued to improve so satisfactorily that before long it was again found that the traffic had outgrown the accommodation of the port.

In April, 1906, the North British Railway applied for, and in the following year obtained, Parliamentary powers for the making of a third dock, immediately to the east of the existing docks, and the contract for the work was placed in the hands of Messrs. Robert McAlpine and Sons (now Sir Robert McAlpine and Sons), of Glasgow. The plans for the new dock were prepared by Messrs. Blyth and Westland, C.E. (now Messrs. Blyth and Blyth), Edinburgh, who were the engineers for all the dock works at Methil.

The works were commenced in 1908, and involved the reclamation from the sea of 44 acres of ground and the construction on the site of a wet dock with an area of 16¾ acres. The outstanding feature of the contractors' operations was the making of the immense sea wall to enclose the reclaimed area. This

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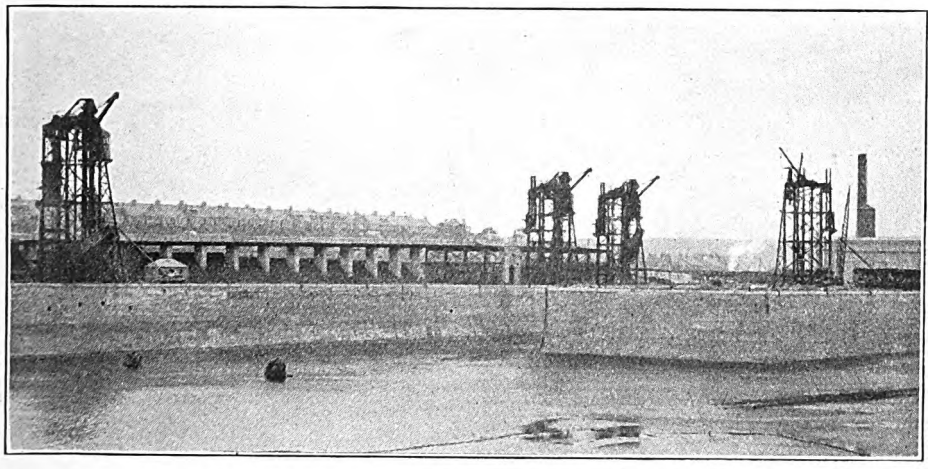
wall, which is about a mile in length, runs along low-water mark from the mouth of the River Leven to a point opposite Methil railway station, about 250 yards from the end of the East Pier. At the base the wall is about 40 ft. in width, and it gradually decreases until at 5 ft. above high-water mark it has a thickness of 17 ft. Above this there is a parapet, which rises to about 15 ft. above high-water level, and the total height varies from 33 ft. to 50 ft. In the course of building the wall two fierce storms were encountered, one in March, 1909, and the other in January, 1910, when very extensive damage was done, which greatly retarded the completion of the works.

In January, 1912, considerable damage was again done to the works by storm, and the new dock and the entrance channel works were flooded to a depth of from 20 to 22 ft. Before the storm some 650 50-ton concrete blocks were deposited along the front of the sea wall, and as these were found to have afforded splendid protection by breaking up the huge waves which rolled in from the North Sea, their number was considerably increased. It is estimated that there are 100,000 cubic yards of concrete in the sea wall, or something like 150,000 tons. In the dock basin the excavations amounted to about 570,000 cubic yards, and the operations of the contractors were so successful that the work along with the construction of the dock walls was completed within a period of 10 months. Notwithstanding the magnitude of the scheme, the whole works were completed and brought into use within a period of a little over four years.

The following table shows the total extent of the dock, &c., accommodation now at Methil :—

		No. 1 Dock.	No. 2 Dock.	No. 3 Dock.
Water area	Acres	4¾	6½	16½
Length of quay walls	Feet	1,900	2,340	5,980
Width of entrance gate	,,	50	50	80
No. of coal hoists	..	1	3	6
No. of coal cranes ..	..	—	1	—
No. of ordinary cranes	..	8	5	1
Depth of water on sill and in dock :—				
H.W.O.S.T. ..	Feet	23	27	32
H.W.O.N.T. ..	,,	18	22	27
Depth of water in approach channel :—				
H.W.O.S.T. ..	Feet	29	29	34
Shed and warehouse accommodation area ..	Sq. ft.	7,770	8,400	Nil
Total area of dock sites —Acres		—	—	103
Total length of sidings, including those at Kirkland Yard, constructed in connection with the docks— Miles		—	—	32



WEST QUAY WALL AND JETTY SHOWING COAL HOISTS.

The new dock has a separate entrance channel, 1,800 ft. in length and 120 ft. in width, which is protected by Methil Pier from the east winds and ground swells blowing in from the North Sea, so that shipping can enter in safety at all times and in all states of weather. The western boundary of the new basin is 1,350 ft. in

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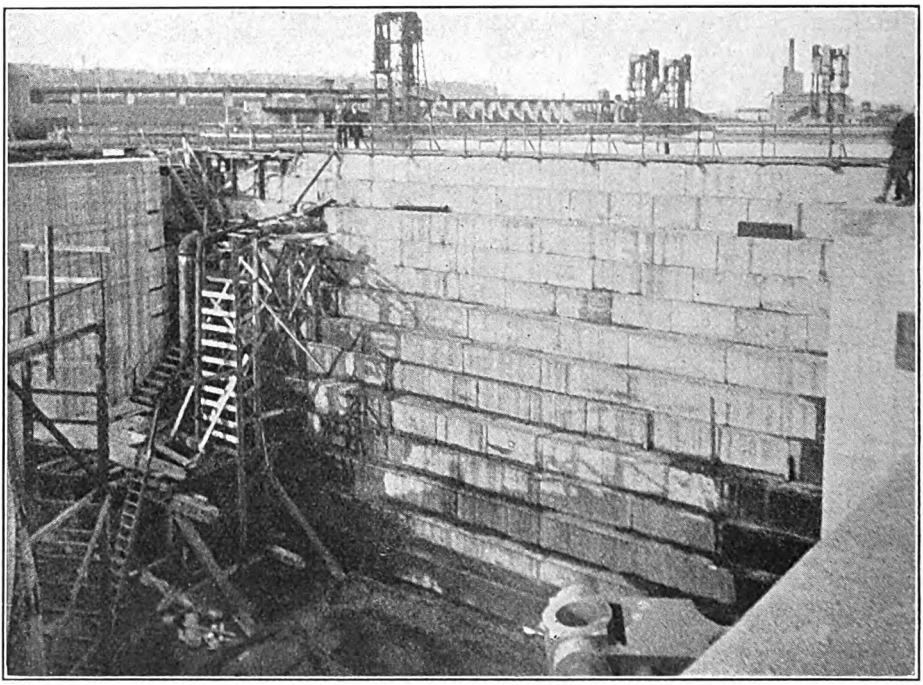
length and the east 1,179 ft., while the width is 780 ft. At the north-east end it is broken up by two jetties, 470 ft. and 550 ft. long respectively, so that the maximum accommodation is provided for ships and coaling hoists. The extent of the docks and equipment provided at Methil are such that there is no difficulty in dealing with the largest class of vessels now engaged in the coal export trade.

The new dock was formally opened for traffic on January 22, 1913, but, unfortunately, after having been partially in use for some time, serious trouble arose in connection with the working of the entrance gates. Preliminary investigations were at once made, which revealed the necessity for the carrying out of extensive repair works, and the dock was closed for traffic on March 18, 1915. In the first place, the dock gates were enclosed within cofferdams, and, as a result of the fuller investigations which were then enabled to be made, it was decided to rebuild the gate entrance.

In June, 1916, a contract was entered into with Messrs. Sir Robert McAlpine and Sons for the extension and rebuilding of the gate entrance to the dock. The contract was one involving great difficulty and risk, but, notwithstanding, excellent progress was all along made with the works. The contractors were, of course, greatly hampered in their operations owing to the continued scarcity of labour and the restrictions placed by the Government on the supply of materials.

The work may be divided into four sections, viz.:—

(1) The cofferdams.



No. 3 DOCK: NEW GATE ENTRANCE.
Inner Cofferdam—View from Top of Wall.

(2) New portion of entrance.
(3) Removal of side walls and rebuilding existing entrance.
(4) Removal of cofferdams.

The cofferdams were built of 10-ton concrete blocks, and designed to retain a head of 36 ft. of water. The inner dam was built across the dock end of the gate entrance, and was about 117 ft. long. The outer dam was built across the entrance channel, connected to the outer quay walls by wing dams at each side, and enclosed an area large enough to take in the extensions or new portions of

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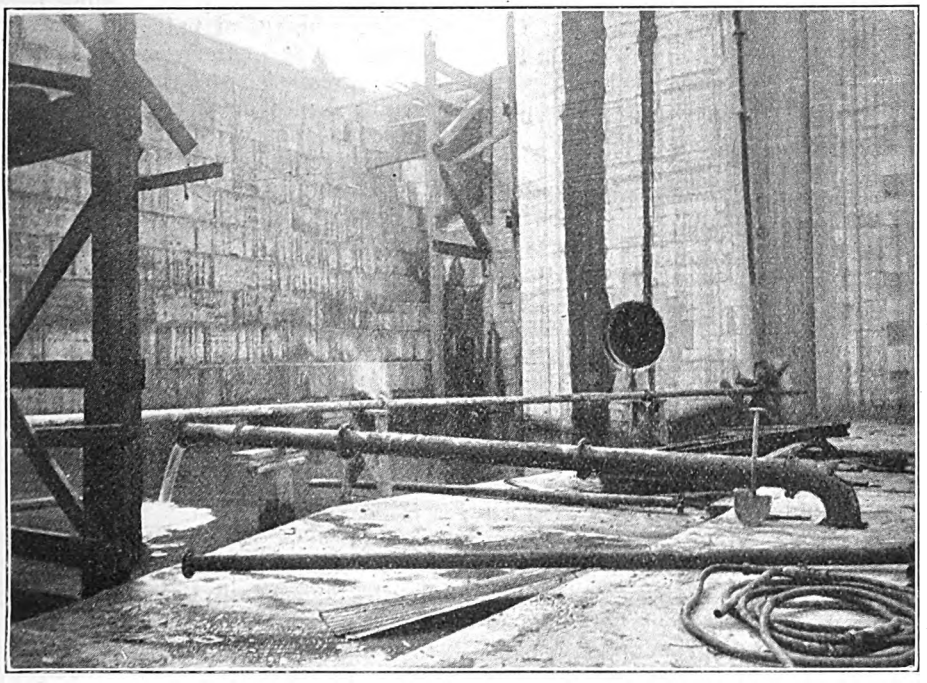
the gate entrance. The bulk of the block setting was done under water by divers, and the dams stood for three and a half years intact and satisfactory.

A commencement was made at the excavation work in connection with the extension of the entrance early in the summer of 1916. The length of the new portions is about 100 ft., and the concrete apron is 14 ft. thick of solid concrete, the sill being 16 ft. thick, and the closing faces are granite blocks embedded in the concrete. The roller path for the gates proceeded with, and good progress was made considering that the work had to be very carefully done, mostly by hand quarrying, on account of the proximity of the inner cofferdam and the new walls. The length of walls removed and rebuilt was 156 ft. on each side of the entrance, and about 14,000 tons of concrete and masonry were thus removed.

The walls as rebuilt are similar to those of the new portion of entrance, sluice culverts being provided here, too. The concrete was all mixed by machines,



No. 3 DOCK: NEW GATE ENTRANCE.
Outer Cofferdam—View from Sill.

is also carried on granite blocks embedded in the apron. The side walls are of concrete, 24 ft. thick, faced with granolithic, with a sluice culvert in each wall for regulating the depth of water in the dock. This part of the work was completed by September, 1917.

Before the old side walls could be taken down it was necessary to drive a line of steel piling across the quay at a distance of about 20 ft. behind, and roughly parallel to, the back of the old walls, to keep back the water-logged filling of the quay. The demolition of the old walls was then erected as near as possible to the works and the materials were delivered to the walls, &c., by 15-ton derrick cranes.

There are two sets of dock gates; one set in the extended portion and the other set in the rebuilt portion of the entrance, and either set can be used as required. They are constructed of steel girders and plates, with greenheart heel posts, and the flooring on which they turn, as well as the step against which they close, are of solid granite. The sill plate alone of a single gate weighs 26 tons, the mitre post 17 tons, and the heel post 17 tons.

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The whole of the foregoing work was completed by the end of March, 1919, when a start was made to the removal of the cofferdams. As in the building the bulk of the blocks had to be removed with the aid of divers.

The whole equipment of the docks at Methil for the handling of export coal is of the most complete description, and in connection with the new dock the hydraulic coaling hoists and portable cranes which have been provided are of a very powerful description. The new hoists were constructed by Messrs. Sir W. G. Armstrong, Whitworth and Co., Limited, of Newcastle-upon-Tyne, and the pumping machinery is by Messrs. Fullarton, Hodgart and Co. The plan of the dock provides for eight coal shipping berths, with nine hoists, and one of the berths has two hoists, both of which can be used at the same time for loading into a vessel. The two hoists at this berth are so placed that by the radial movement of the coaling shoots the largest vessels coming to the port can be coaled at all four hatchways without the vessel being moved. Six of the hoists have been erected, and the others will be provided as the traffic requires. Two of them are capable of lifting 35 tons to a height of 55 ft., and the others the same weight to a height of 45 ft. All the hoists at No. 3 Dock are fitted with improved anti-breakage appliances. A large power station of brick, with two chimneys, in which is housed the steam boilers and engines for supplying pressure to the hydraulic machinery and for generating electricity for the lighting up of the docks and sidings, has been erected on a site close to the north quay of the new dock. Pipes from the power station are carried underground round the quays to the coal hoists, as well as to the portable hydraulic coal cranes, the pressure being 700 lb. to the square inch.

A very interesting and up-to-date installation of weighing machinery has been provided in connection with the new hoists. There are two "Avery" weighbridges affixed to each coal hoist, one on the ground level, of 30 tons capacity, upon which loaded wagons are weighed, and one of 20 tons capacity, on the high level, upon which the empty wagons are "tared" after discharging into the ship. By a new device both the ground-level and the high-level weighbridges indicate into one weigh office. The weighman can thus record the loaded weight of a wagon and shortly after he can note the empty weight of the same wagon, although it is far overhead out of sight. The whole weighing apparatus was designed and manufactured by Messrs. W. and T. Avery, Limited, of Birmingham and Glasgow, and a considerable number of patent devices have been employed in the work, with a view to the greatest speed and accuracy in weighing being obtained.

In connection with the new dock, a complete re-organisation of the railway arrangements was made, not only within the area of the docks, but very costly improvements were also carried out in the approaches, especially at the Leven end. As will be seen from the plan of the docks on page 78, the lay-out of the sidings and lines is such that all superfluous shunting is avoided. At Kirkland, to the west of Leven, a yard with 12 miles of sidings, and capable of storing 30,000 tons of coal, has been laid down, and from this most of the hoists are fed from collieries on the North British railway system. To facilitate the working of this traffic the branch to the dock from the Leven Railway has been replaced by four sets of rails, the construction of which involved the building of a retaining wall in the River Leven, as well as several bridges. From the Methil end the majority of the coal comes off the Wemyss Estate, being conveyed direct to the dock over the lines of the Wemyss private railway.

The foregoing will give a general idea of the magnitude, not only of the new works carried out at Methil, but of the immensity of the trade of Scotland's first coal port, in which a capital of about £1,350,000 has now been sunk. It is fully anticipated that the works which have been provided will meet the demands of the Fifeshire coal trade for many years to come.

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Locomotive and Train Working in the latter part of the 19th Century.

MIDLAND RAILWAY. [No. IV.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

MY earlier account of the locomotive stock ended with the engines in use in 1875. Owing to the opening of the Settle and Carlisle road, Mr. Johnson found it necessary to increase considerably the number of express engines, at the same time augmenting their power. But it should be observed that in many respects the design of the older 890 class was left unaltered, the principal changes being in the adoption of larger boilers and in the external appearance of the splashers.

The first express engines, ten of which were built at Derby in 1876, were Nos. 1, 9, 10, 13, 70, 71, 73, 74, 96, and 146*; these were all fitted with the Westinghouse brake. They had 17 in. by 24 in. cylinders. 6 ft. 2½ in. coupled wheels, and 140 lb, pressure, and most of them were immediately stationed at Skipton to run over the Carlisle road. But whether the wheels were too small, or owing to some other cause, they were not liked on the fast expresses. As a matter of fact, several of them broke their crank axles, and after two or three years at Skipton they were transferred to Nottingham for local and secondary expresses, except No. 96, which had been sent to and remained at Kentish Town for some time.

The boilers of these engines were of Mr. Johnson's standard size, and had 223 1¾-in. tubes. The total heating surface was 1,225 sq. ft., of which the firebox provided 110 sq. ft. They had an excellent reputation for steaming, and put the Midland engines in the front rank at that period. The same boilers were used on the "50," "1282," and "1312" classes, to be described below, and nearly all the celebrated "800" class were rebuilt with them. All engines had 140 lb. pressure. The "50" class were also built at Derby in 1876, but with larger cylinders, 17½ in. by 26 in. Of these 50 to 54, which were quartered at Sheffield, had 6 ft. 6 in. coupled wheels, but 55 to 59 had 6 ft. 8 in. wheels, and were sent to Skipton to run to Morecambe, Leeds, Bradford, &c., but were subsequently transferred to Sheffield. In 1880, when the York

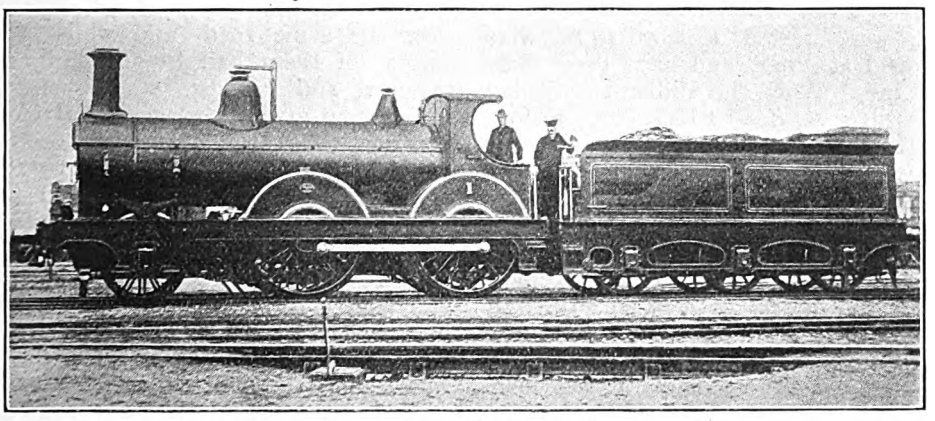

Photo.] [*Loco. Publishing Co., Ltd.*

Mr. S. W. JOHNSON'S 2-4-0 ENGINE No. 1.

Built at Derby, 1876. Coupled wheels, 6 ft. 2½ in. Cylinders, 17 in. by 24 in. Pressure, 140 lb.

* These ten engines became 147 to 156 in 1907.

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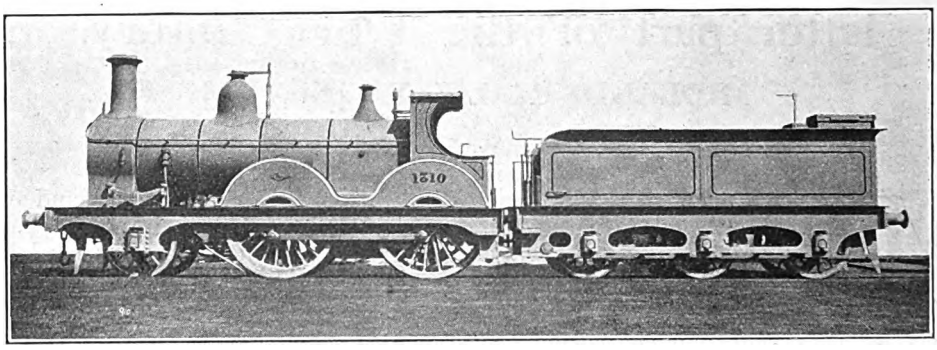

S. W. JOHNSON'S 2-4-0 ENGINE, No. 1310 (SERIES 1282 to 1311).

Built by Dübs & Co., 1876. Coupled wheels, 6 ft. 6 in. Cylinders, 17½ by 26 in. Pressure, 140 lb.

Nos. 1302 to 1311 of this class worked the fastest Scotch Expresses between Carlisle, Skipton and Leeds for nearly ten years.

trains were started, Nos. 56 to 59 were stationed at York, and have been there ever since. When the Midland instituted a passenger service to Hull from Milford Junction in 1883, Nos. 53, 54 and 55 were sent to Hull for this purpose, but, as these trains were extremely light, the engines were replaced at Hull by the old 2–2–2 singles, until 1889, when this service was discontinued. Nos. 50 to 59 are now Nos. 187 to 196.

Engines 1282 to 1311 were very celebrated locomotives, and justly had an excellent reputation amongst the men. They had 6 ft. 6 in. wheels and 17½ in. by 26 in. cylinders, and were built by Messrs. Dübs and Co. in 1876. The first twenty of them, Nos. 1282 to 1301, were fitted with Smith's *simple* vacuum brake, and were employed almost entirely on the London and Manchester expresses, a large number being stationed at the latter place. In 1880 they were removed to Bristol, and many are still to be seen between Birmingham and Bristol, though others are now to be found at Nottingham and on other parts of the Midland system. Nos. 1302 to 1311 were fitted with the Westinghouse brake, and stationed at Carlisle, and for many years did excellent work on the Scotch expresses. With these engines the Carlisle men usually ran as far as Skipton, but, in addition, they had an early morning turn to Leeds, and with one of the night Scotch trains they worked to Bradford. In 1885, 1306 to 1311 were moved to Hellifield, but still worked over the same road, and whilst there several of them had the coupling rods removed and ran as "single engines, in order to give a thorough trial to the new sand blast which had just been invented by Mr. Holt at Derby. In 1888, Nos. 1306 to 1311 were removed from Hellifield to Normanton, and included in their work was the most important West of England express from Leeds to Birmingham and back. Nos. 1282 to 1311 are now Nos. 157 to 186.

In 1877 Mr. Johnson introduced 7 ft. wheels on to the Midland, and constructed at Derby Nos. 1347 to 1356, 2–4–0 engines, with 17½ in. (later enlarged to 18 in.) by 26 in. cylinders. In 1879 these engines became Nos. 101 to 110. The first four were for a good many years at Skipton, and 101 and 102 had the Westinghouse brake. The others were stationed at Saltley, and ran to Bristol and to Leeds. They are now Nos. 197 to 206.

The first 4–4–0 engines with leading bogies had, however, preceded the engines just mentioned by a few months. These were 1312 to 1321, with 6 ft. 6 in. wheels and 17½ in. by 26 in. cylinders, and were built by Kitson and Co., 1876–7. Generally speaking, they may be described as the "1282" class, with the substitution of a leading bogie having 3 ft. 3 in. wheels in place of the single 4 ft. 2 in. leading wheels of the latter class. These engines were stationed at Liverpool, and originally ran between that city and Derby. They have spent the whole of their existence

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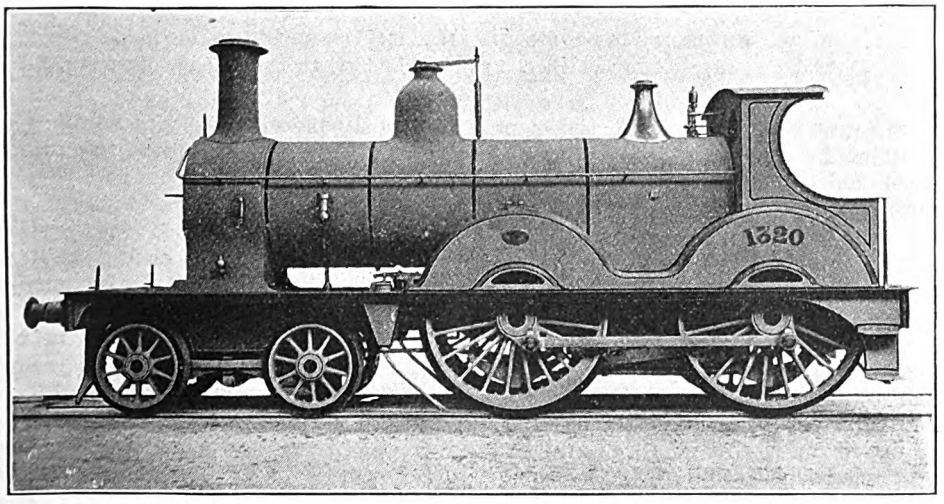
in the Liverpool district, but three or four of them are now scrapped. For many years they were employed to run the Midland expresses between Liverpool (Exchange) and Blackburn over the Lancashire & Yorkshire Railway. After the 1907 renumbering they became 300 to 309. On many occasions during the "eighties they worked theatrical specials from Liverpool over the M.S. & L. Railway through to Leeds and Bradford *viâ* Godley Junction and Barnsley, but throughout their existence they have not been familiar engines on the Midland, as they have passed a somewhat secluded and retired life in the Cheshire Lines corner of the system.

A much better-known class consisted of the twenty 7 ft. coupled 4–4–0 engines, Nos. 1327 to 1346, constructed by Messrs. Dübs & Co. in 1877. These were the first Midland engines to have 18 in. by 26 in. cylinders, with the exception of a few of the rebuilt "800" class. The bogie wheels were 3 ft. 6 in. in diameter, and here I may remark that throughout his superintendency until the "Belpaire" engines were built, Mr. S. W. Johnson made this a standard diameter for the bogie wheels of 7 ft. and 6 ft. 9 in. coupled engines, but for all 6 ft. 6 in. coupled engines the diameter of the bogie wheels was reduced to 3 ft. 3 in. The 1327 class had very large boilers for that period, with a total heating surface of 1313 sq. ft., of which the firebox supplied 110 sq. ft. The total weight was slightly over 42 tons in working order. Of these engines Nos. 1327 to 1340 were fitted with Smith's simple vacuum brake, and utilised on the Manchester expresses between Leicester and London and Leicester and Manchester. In 1882 they were all stationed at Cornbrook (Manchester), and remained there for many years, with the exception of 1336 to 1339, which went later to Birmingham, and ran for a long time both on the Bristol and the Leeds trains from that place. 1341 to 1346 started at Leeds in 1877 on the Leicester and Birmingham expresses, and after a number of years also found their way to Manchester. In spite of the 7 ft. wheels, a diameter which may be considered large for the heavy 1 in 90 banks of the Manchester-Derby line, it was thought better to have bogie engines on this section, with its numerous curves in the Peak district. The Manchester engines ran to Leicester, Derby and Nottingham.

Mr. Johnson, however, did not finally decide upon 4–4–0 bogie engines as standard until 1882, for between 1879 and 1881 he built 75 more 2–4–0 engines.



ONE OF THE FIRST 4.4-0 ENGINES BUILT FOR THE MIDLAND RAILWAY, No. 1320 (SERIES 1312 to 1321)

Built by Kitson & Co., Leeds, 1876–7. Coupled wheels, 6 ft. 6 in. Cylinders, 17½ in. by 26 in.
These engines had no brakes on engines wheels when new, but were afterwards fitted with Smiths' simple vacuum brake.

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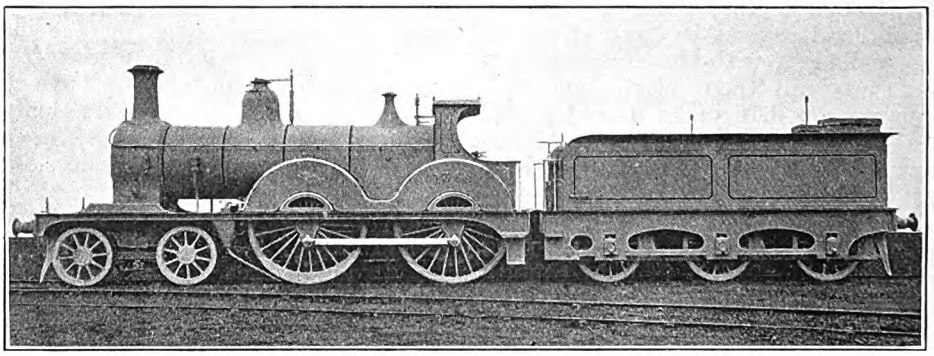
Of these, 1400 to 1409 (Derby, 1879), 1472 to 1491 (Derby, 1880), and 1502 to 1531 (Neilson, 1880–1) had 6 ft. 9 in. wheels and 18 in. by 26 in. cylinders, and were principally employed on the main line express trains between Leeds and London. In 1883, Nos. 1400 to 1409 were transferred to Carnforth and Lancaster, and have been there ever since. They are now Nos. 207 to 216, and were the first engines to have the modern type of tender, with springs outside below the platforms. Nos. 1472 to 1474 were for a time at Leeds, 1475 to 1486 at London, and 1487 to 1491 at Leicester. These engines are now Nos. 222 to 241. Of the 1502 class built by Messrs. Neilson, 1502 to 1526 spent many years at Leeds, and 1527 to 1531 were at Nottingham.



S. W. JOHNSON'S 4-4-0 ENGINE No. 1346 (SERIES 1327 to 1346).
Built by Dübs & Co., 1877. Coupled wheels, 7 ft. Cylinders, 18 in. by 26 in. Pressure, 140 lb.

They are now Nos. 242 to 271, and some are still at Leeds, the others being distributed chiefly between Sheffield and Skipton.

Nos. 111 to 115 (1880) had 6 ft. 6 in. wheels, and were Sheffield engines, but owing to the working of the main line expresses being in the hands of the Leeds men, the Sheffield engines had to content themselves with secondary expresses and stopping trains.

The last 2–4–0 engines to be built came out from Derby in 1881, and had 7 ft. coupled wheels and 18 in. by 26 in. cylinders. Of these 1492 to 1498 went to Leicester for the London expresses, 1499 and 1501 remained at Derby for some years, and 1500 was painted red when new, being one of the half dozen engines selected for a trial of the proposed new colour, and was sent to Bristol to run the Birmingham expresses. These engines eventually joined the others at Leicester, and as 272 to 281, mostly remain in that district on secondary services.

I have mentioned previously that there was a lack of tank engines for local passenger traffic, and although certain other railways were in like position, the Midland was certainly far behind the Great Western and London & North-Western railways in this respect. In 1875–6 Mr. Johnson set about remedying this deficiency. His first 10 engines, built at Derby in 1875, were, however, additions to the locomotive power for the London local trains. They were 0–4–4 side-tank engines, with condensing apparatus, of a class almost identical with those which he had previously placed in service on the Great Eastern Railway, and, like these engines, the new Midland No. 6 class had 5 ft. 3 in. coupled wheels and 17 in. by 24 in. cylinders. They took their turns, with the engines of the 780 class previously described, on the South Tottenham and City trains, and remained in the London district until 1900, several of them being quartered for some time at Cricklewood shed. They are now at work on different branches in the country.

There were, however, a good many other centres badly in need of passenger tank engines, and chief amongst these was the Bradford district. For many years I heard it frequently—and, I believe, truly—stated that more passengers were booked at Bradford than at any other station on the Midland line.

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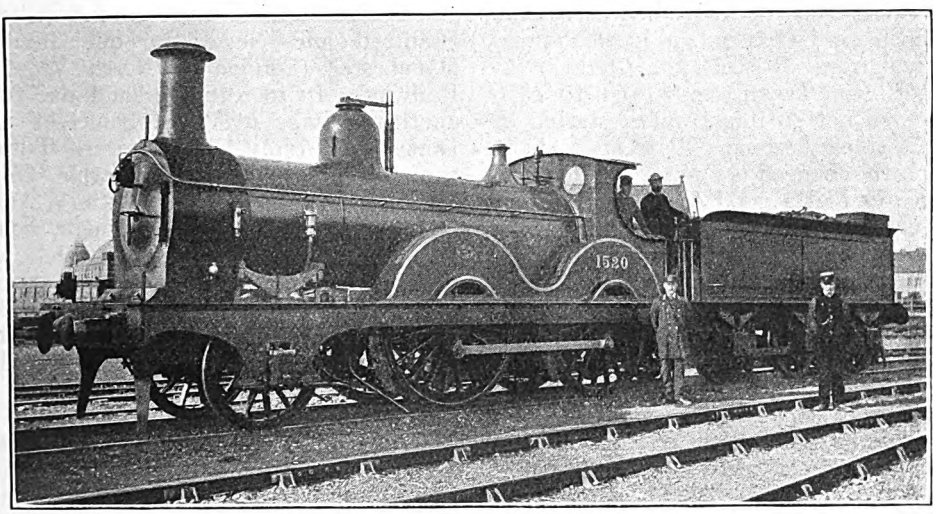

Photo.] [*Loco. Publishing Co., Ltd.*

Mr. S. W. JOHNSON'S 2-4-0 ENGINE, No. 1520 (CLASS 1502-1531).

Built by Neilson & Co., 1880–1. Coupled wheels, 6 ft. 9 in. Cylinders, 18 in. by 26 in.

The local trains, of which there were a large number, were until 1876 worked entirely by tender engines of the 2–2–2 and 2–4–0 types, but in 1875–6 Messrs. Neilson & Co. built thirty 0–4–4 side-tank engines, Nos. 1252 to 1281. Of these, 20 were immediately sent down to Bradford, their appearance there having been heralded by the London condensing tank engine No. 147 of the No. 6 class just described, which was tried at Bradford for a short time. The new engines, which, of course, were non-condensing, differed from the No. 6 class in having wheels 5 ft. 6 in. diameter, and were the only 0–4–4 tank engines to be built for the Midland with wheels as large as this, for subsequently Mr. Johnson reverted to 5 ft. 3 in. wheels for all his passenger tank engines. They had fairly large boilers, giving 1209 sq. ft. of heating surface, which included 110 sq. ft. supplied by the firebox, and carried 140 lb. per sq. in. pressure. The tank capacity was 1050 gallons. On their arrival at Bradford a number of 2–2–2 singles were removed to Nottingham and the Midlands. Owing to a change in the working at Leeds (where the Bradford main line engines had hitherto run their trains round the Water Lane curve and backed them into Leeds station) being found necessary, the Bradford–London trains were now run straight into Leeds station, so that the Bradford passenger engines did not afterwards work south of that place, and the singles were therefore of little use at Bradford, which, however, always retained about twenty 2–4–0 engines with 6 ft. 2 in. wheels. Since that time Bradford has always been one of the chief centres of Midland tank engine activity, about 35 of the type being stationed there. They have always taken their turns with the tender engines on the London expresses between Bradford and Leeds, and used to perform some very fast running on these trains. From Bradford to Leeds the line falls gradually almost the whole distance, except for a rise from Kirkstall to Armley Canal Bridge, and the tank engines were always worked on all trains to Leeds, bunker or bogie first, whilst from Leeds to Bradford they returned chimney first. They did not run south of Leeds, and in the opposite direction Skipton was their furthest objective, though subsequently they ran to Hellifield and Ingleton. Many of the Ilkley and Otley trains were and are still worked by them, and the 0–4–4 type was sometimes to be seen on the Midland trains between Leeds and Harrogate.

Of the remainder of the new 0–4–4 tank engines, No. 1273 was put to work on the Bedford and Hitchin branch, and 1274 to

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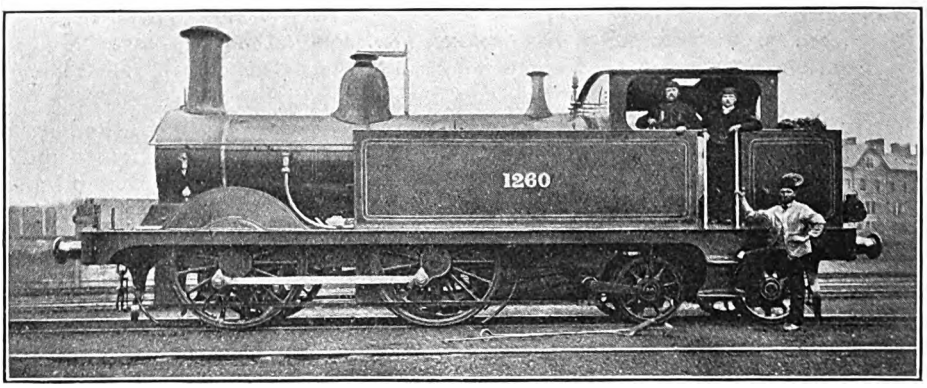
1281 were sent to Bristol, where they remained until 1884 on the local Midland services from Bristol (St. Philips) to Bath, Clifton Down, &c. Prior to 1876 Bath was not so important a station as it has since become. Passengers from the north changed at Mangotsfield, and frequently had a good deal of wearisome waiting at that station. The old Somerset and Dorset Railway, then an independent company, used Bath (Midland) station, and ran trains thence to Wimborne Junction. This railway, as it then was, had to be travelled over to be properly appreciated, for no pen of mine could do it justice. The trains swayed about from side to side with a roll like that of a battleship in a heavy sea, and finally, in 1875, a bad smash at Radstock put an end to its independent existence, after which the Midland and London & South Western companies stepped in and gathered up the remains. The last express from Bath as often as not would miss its connection at Wimborne, which it was supposed to make with the London & South Western Railway train to Weymouth, and the passengers for this seaside resort had to spend the night in Wimborne at their own expense.

In 1880 the Midland started the first of the through trains from the North to Bournemouth *via* Bath, coaches being run on the Bristol expresses from Bradford, and later from Newcastle, which were detached at Mangotsfield. Since then the Bournemouth service has attained great importance, and through expresses are now run with dining cars not only to Bradford and Newcastle, but also to Manchester (London & North Western Railway). In 1888 the Midland also tried another service over the Somerset and Dorset as a reply to the Severn Tunnel competition instituted by the Great Western and London & North Western railways. This was a through coach from Bradford to Plymouth, which was handed over to the London & South Western at Templecombe. The distance was, however, too great, and after some months the Plymouth service was discontinued.

The "Cathedral Route" is the title which has been given to the Great Eastern line which runs north through Ely and Lincoln, the trains over which continue their journey to York on North Eastern territory. But this title is equally as applicable to the Midland from the West to the North (York), which has the cathedral cities of Bath, Bristol, Gloucester, Worcester and York on its route. To these may now be added Birmingham, whose parish church has more recently been promoted to cathedral rank, and the spires of Lichfield cathedral are plainly visible to a passenger in a Midland train near Barton and Walton, before reaching Burton-on-Trent. Some wretched politicians with diseased imaginations would perhaps have included the last-named town in the list of Midland cathedral cities on the grounds of some mysterious connection which they suppose to exist between "bishops and beer." But Burton-



S. W. JOHNSON'S TANK ENGINE, No. 1260 (SERIES 1252 to 1281).
Built by Neilson & Co., 1875-6. Coupled wheels, 5 ft. 6 in. Cylinders, 17 in. by 24 in.

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on-Trent is not the least interesting town on the Midland from many points of view, and those readers specially interested can obtain their fill of railways there, since the streets are intersected and barricaded with level crossings every few yards. Some of the oldest Midland shunting engines are kept there to attend to the beer. Officially these old engines are recorded as dating back to 1847–8, but this is a clerical anachronism, for in actual truth there is nothing older than 1857–8 in them, and only five of them remain at work.

There is one branch of the Midland which has always, since 1875, been worked by 0–6–0 side-tank engines. This is the Keighley and Worth Valley line, a single but very busy branch line to Oxenhope. Until 1883 goods tank engines were used, but in that year five similar engines, Nos. 218, 219, and 1397 to 1399 were specially built with "all-over" cabs and the vacuum brake, and these engines might be termed the Midland "Terriers." The standard 0–6–0 side-tank engine has 4 ft. 6 in. wheels and 17 in. by 24 in. cylinders.

In 1874 the Midland took over the Swansea Vale line and branches, of which the main portion runs between Swansea and Colbren Junction, from which point to Brecon it is really the property of the Neath & Brecon Railway, though worked entirely by the Midland. The old Swansea Vale locomotive stock consisted in 1874 of a dozen saddle-tank engines in various stages of decrepitude, and these were promptly transported to Gloucester for shunting the docks and sidings there. Mr. Johnson's first new engines, therefore, had to be made to replace these, and in 1874–6 the standard 0–6–0 tank engines 1102 to 1141 were built, of which the first 20 were put to work on the Swansea Vale and remained there many years, both on passenger and goods trains. Midland goods tender engines 700 to 706, then stationed at Brecon, took the goods trains on to Worcester and Birmingham. Now a number of 0–4–4 bogie tank engines work between Swansea and Hereford.

Of the other 0–6–0 tank engines, 1122 to 1141, a number were stationed at Kentish Town for shunting purposes, and some half-a-dozen worked the Keighley and Worth Valley branch. These 40 engines are now Nos. 1620 to 1659, and are now distributed all over the system.

(To be continued.)

Locomotive and Train Working in the Latter Part of the Nineteenth Century.

Railways already dealt with in the "Railway Magazine" by Mr. E. Ahrons are:—

L. & N.W.: Jan., Feb., March, May, 1915. (All out of print.)
GREAT NORTHERN: June, July, 1915. (Both out of print.)
MANCHESTER, SHEFFIELD & LINCOLNSHIRE: Aug., Sept., Oct., 1915. (Aug. and Oct. out of print.)
GREAT WESTERN: Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916. (Dec., Jan., Feb., June, July, and Aug. out of print.)
GLASGOW & S.W.: Sept., Oct., 1916. (Sept. out of print.)
GREAT EASTERN: July, Aug., Sept., Oct., Nov., Dec., 1918. (Dec. out of print.)
NORTH EASTERN: Nov., Dec., 1916. Jan., Feb., March, April, May, 1917. (Nov., Dec., 1916, Jan. and Feb., 1917, out of print.)
SOUTH EASTERN: June, July, Aug., 1917.
LANCASHIRE AND YORKSHIRE: Sept., Oct., Nov., 1917.
LONDON, CHATHAM & DOVER: Dec., 1917. Jan., Feb., 1918.
CALEDONIAN: March, April, May, June, 1918.
LONDON BRIGHTON & SOUTH COAST: Jan., Feb., March and April, 1919. (First three out of print.)
MIDLAND: May, June and July, 1919. (May out of print.)

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THE RAILWAY BENEVOLENT INSTITUTION.

Elliott] [*& Fry*

MAJOR DAVID DAVIES, M.P.,

Chairman, Cambrian Railways, and President of the Railway Benevolent Institution.

PRESIDING at the recent sixty-first annual meeting of the Railway Benevolent Institution, Major David Davies, M.P., said that in looking back over the past 61 years' completed working of the Institution he did not think there was any benevolent institution in the United Kingdom which could show such an extraordinary record of working. Established in 1858, the first year's income was £2,230 ; in 1879 its revenue had increased by some 650 per cent. to £16,896. After the next 20 years the income had risen in 1899 to £63,639—a further increase of 276 per cent.—and now, in 1919, the income stood at £129,337, being a further increase of 103 per cent. over what it was in 1889. He added they did not know whether the Government would nationalise railways or not. But whatever might be their fate in that respect, he felt sure that that Institution, which had done so much to alleviate distress, would not have its activities interfered with, but that its position would be made secure by any legislation that might be brought before the House of Commons.

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CONWAY STATION.
From "The Illustrated London News," August 26, 1848.

The Chester and Holyhead Railway.

THE IRISH MAIL ROUTE. [No. I.]

By H. H. MEIK.

PRIOR to the advent of railways Irish mails and passengers, luggage, &c., were conveyed between London and Ireland by coach to Liverpool, and thence by boat to Howth Harbour, from which place they were transported by coach to Dublin. Afterwards they were sent by way of Shrewsbury *via* Llangollen, Corwen, Bettws-y-coed, Capel Curig and Bangor, this route having been made feasible by means of the highway which was engineered and carried out by that great road maker and bridge builder, Thomas Telford, C.E. When the London and Birmingham Railway was opened in 1838 the point of departure for the coaches was from the latter place to Shrewsbury and thence over the above road.

In 1837 the Irish Railway Commission authorised the survey of a line from Porthdin-llaen, on the Carnarvonshire coast, to Shrewsbury, which had been recommended by Government; and early in 1838 the Chester and Crewe Railway, which had been incorporated in 1837, engaged George Stephenson to survey a line from Chester to Holyhead in continuation of their own line.

In 1839 the Government and the Admiralty each appointed special commissions to inquire into the merits of the various schemes, and to report as to the manner in which railway communication could be most advantageously promoted with Ireland. The Commissioners expressed the opinion that it was essential that the most rapid communication between England and Ireland should be established, and that Holyhead offered the shortest passage across the Channel and was the best place on the Welsh Coast for a harbour and cross-Channel services.

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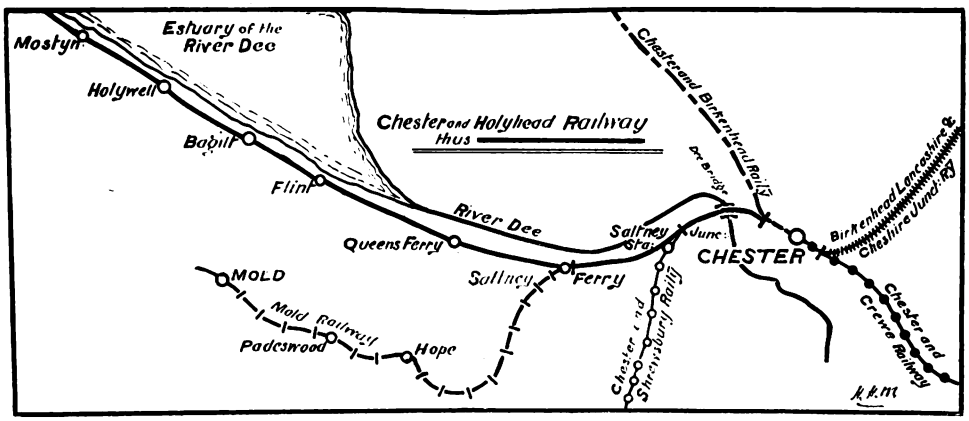
In 1840 a special committee was appointed by the House of Commons, and they reported very decidedly in favour of the Holyhead route as being in every respect the best position for a packet station in connection with Ireland, but that it would be necessary to construct a new harbour at Holyhead for large steamers. The Committee also stated that the best line of railway between the two countries was that proposed by George Stephenson, *via* Bangor and Holyhead. The Conway river and the Menai Straits were certainly drawbacks to the route, but the favourable position of Holyhead in connection with the Irish mails and general traffic practically fixed the line of route as eventually constructed

In the meantime a Committee nominated at Chester procured a report from George Stephenson, who stated that the line from Chester to Holyhead would be about 84 miles in length, some 60 miles of it being practically level, comparatively free from difficulties and cheap to construct. On the other hand he stated that the proposed line from Shrewsbury to Porth-din-llaen, on the Carnarvonshire coast not far from Pwllheli, was almost impracticable with regard to gradients in the then general acceptation of the term.

In December, 1842, a deputation consisting of the Lord Mayor of Dublin, the High Sheriff and other well known Dublin citizens, waited on the Lord Lieutenant in order to convey to him the resolutions adopted at a public meeting of the inhabitants of Dublin as to railroad communication between London and Dublin *via* North Wales. A Committee appointed by the Government also submitted proposals for the improvement of Holyhead Harbour and the payment to the railway company of a fixed sum per annum for the conveyance of mails, &c., for a fixed term of years, with the result that in July, 1843, the Government took under consideration plans for quickening intercourse between England and Ireland by means of a railway from Chester to Holyhead as proposed by George Stephenson. The outcome of this action was that a company was formed to construct a railway from Chester to Holyhead Harbour, and on March 13, 1844, a Bill was introduced in Parliament. As it was in a measure under Government patronage,



RAILWAY CONNECTIONS AT CHESTER.

there was practically no opposition; and Royal Assent was granted on July 4, 1844 (7 & 8 Vict. Cap 65). The Company was authorised to raise capital to the amount of £2,100,000 by issuing 42,000 shares of £50 each, and to borrow £700,000. The London and Birmingham Railway Company were empowered under the Act to subscribe £1,000,000.

During the Session of 1847 the Company procured further Acts: (1) Holyhead Extension and Amendment Act (1 mile 77 chains), with authority to raise shares to the extent of £350,000 and loans to the amount of £116,666; and (2) The Chester Extension and Amendment Act, with authority to raise £50,000 by shares and £16,666 by loan.

The line started from a junction with

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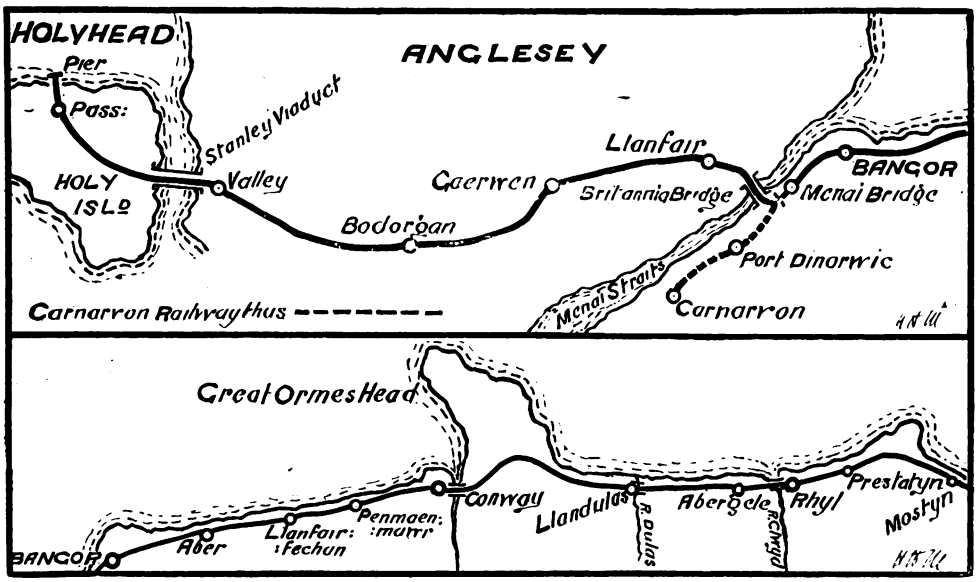
the Chester and Birkenhead Railway (opened on September 30, 1841) at or near Brook Street, Chester, 17 chains west of the present general station. This latter line joined the Chester and Crewe Railway (opened October 1, 1840) and had before that date been acquired by the Grand Junction Railway (afterwards an integral part of the London and North Western Railway. The Shrewsbury and Chester Railway (now part of the Great Western Railway) also ran into Chester. This line was opened on 16th October, 1848, and joined the Chester and Holyhead Railway at Saltney Junction, 1 mile 67 chains west of Chester Station, into which that year. The station, although not quite complete, was opened for traffic on August 1, 1848, and remained very much in the same condition until 1905, with the exception of an extra platform.

The station consisted of a facade facing the City of Chester, built of dark-coloured bricks relieved with stone facings and dressings. The centre of the building, which is or was two storeys in height, containing on the ground floor the usual station offices and on the upper floor the offices of the various companies. Inside the station there were in 1848 large main through platforms 750 ft. long by 20 ft. wide, and two platforms for arriving



ANGLESEY AND RHYL–BANGOR SECTIONS.

the Company had access by virtue of running powers.

In the autumn of 1846 it was agreed between the London and North Western, Chester and Holyhead, Chester and Birkenhead, Lancashire and Cheshire Junction* Railways that they should erect a joint station at Chester. Mr. Robert Stephenson was appointed Engineer, and in the summer of 1847 the contract was let and the first stone laid in August of

* The Chester and Birkenhead, and the Birkenhead, Lancashire and Cheshire Junction Railways were amalgamated by Act of 10 and 11 Vict: Cap. 222 (1847) under the title of the latter-named Company.

trains, each 290 ft long. There were also bays at each end. The station was covered by an iron roof of 60 ft. span, the height of the walls on which the roof rested being 24 ft. from platform level. Behind the passenger station and only divided from it by a series of pillars and arches, was a shed for spare carriages, 450 ft. long by 52 ft. wide, and covered by an iron roof. There was also a gasometer to produce light for the station and a pumping engine to supply water for station requirements.

The goods shed, commenced in August, 1848, was laid out to be a building 200 ft. long by 170 ft. broad and arranged for

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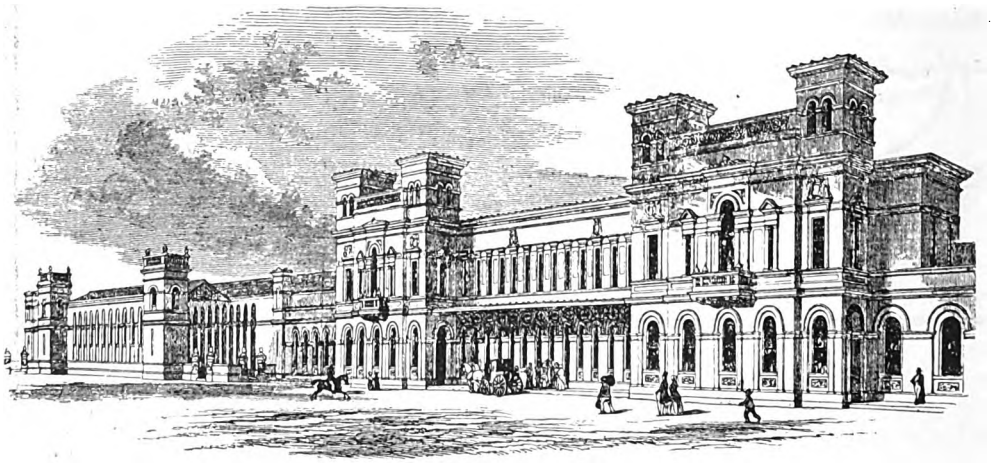
the transfer of goods from one company to another. In consequence of a public road crossing the line on the level close to the station it was necessary to erect a brick and stone bridge over the line at a cost of £13,000.

Work was commenced early in 1845, and in the first few miles out of Chester involved a tunnel about 400 yards long under the (now) Cheshire Lines Committee's Station, Victoria Road, and Upper Northgate Street, after which the line passed through the City walls and crossed the River Dee by an iron bridge, afterwards referred to, near the end of the race course.

After leaving the bridge the line descends to the low ground and runs parallel with and on the south west side of the River Dee as far as Connah's Quay, from whence it skirts the estuary of the Dee as far as the Point of Ayr. Then it turns westwards, still following the coast, to Rhyl and Colwyn and through the Rhuddlan Marshes to near Abergele. The line then cuts off the Great Orme's Head peninsula and reaches Conway through the Tubular bridge over the river of that name. After this it tunnels through Penmaenmawr to Bangor, beyond which the line crosses the Britannia Tubular Bridge and enters the Isle of Anglesea, the south side of which it skirts to Holyhead Island and Harbour.

The line was opened from Chester to Conway on May 1, 1847, to Bangor on May 1, 1848, and from Llanfair to Holyhead on August 1, 1848. Until the intervening gap between Bangor and Llanfair, including the Britannia Bridge, was opened on March 18, 1850, passengers and goods were conveyed between these two places by coach over Telford's Suspension Bridge.

So far as the writer has been able to discover the original stations were Chester, Queen's Ferry, Flint, Holywell (considered a handsome station of good design, and named after the Holy Well of St. Winfrede, supposed to restore health and make the crooked straight), Mostyn, Prestatyn and Rhyl (in 1830 a mere fishing village), Abergele, Conway (entered under a pointed arch through the ruins of Old Conway Castle), Aber and Bangor (built in the Italian style and then comprising a long building of two storeys with windows enriched with mouldings and an umbrella roof over the platform).



GENERAL STATION CHESTER.
From "The Illustrated London News," August 19, 1848.

The following stations were opened prior to July, 1858, when the line was leased or amalgamated with the London and North Western Railway: Colwyn in 1849-50, Penmaenmawr in 1850, Britannia Bridge in 1851 (superseded in 1858 by the present Menai Bridge Station), Gaerwen, Bordogan, Ty Croes and Valley, about 1849–1850.

Holyhead Station was at first only a temporary one, and passengers and goods had to traverse about a mile in order to

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reach the boats. Afterwards, however, the line was prolonged to the harbour and the steamer berths.

On August 20, 1868, Abergele was the scene of one of the most terrible accidents which had occurred up to that date on the London and North Western Railway. The Irish Mail which left Euston at 7.15 p.m. dashed into some trucks loaded with oil, which had broken loose from a goods train at Llysfaen Lime Works, at the upper end of the Llandulas incline. These wagons ran down the line and crashed into the coming mail train, with the result that the locomotive and first three coaches of the mail were wrecked and enveloped in flames and smoke which spread in every direction. On after investigation the remains of 33 persons were discovered.

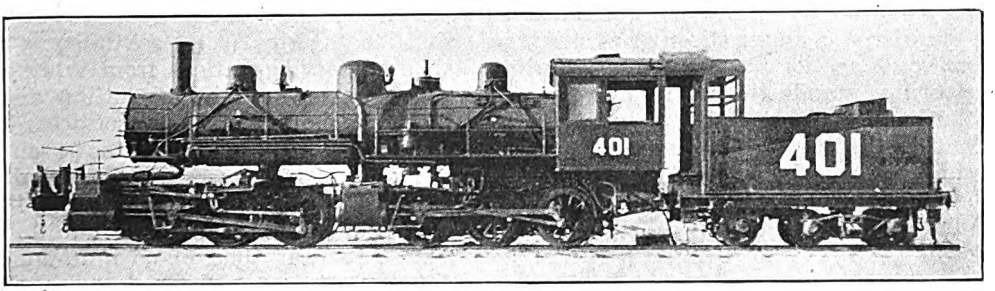
Penmaen Rhos tunnel, between Llandulas and Colwyn Bay stations, runs through limestone, and is 470 yards long and perfectly straight throughout, the west entrance having castellated towers. Conway tunnel situated on the west side of Conway Station, is less than 100 yards in length. The two tunnels through Penmaenmawr come next. The first is Penmaen Bach, 700 yards long, and is situated between Conway and Penmaenmawr stations. It is covered over for some yards at each end in order to carry Telford's Holyhead road. The second is Penmaenmawr, about 225 yards long, through basalt rock. It is situated between Penmaenmawr and Llanfairfechan stations. Llandegai tunnel is about 500 yards long through slaty rock and is situated between Aber and Bangor stations.

Bangor tunnel is at the east end of Bangor Station and is about 900 yards long. Belmont tunnel, 620 yards long, is at the west end of the station. It was formerly longer but was opened out at its east end to admit of an enlargement of the station.

In the Isle of Anglesea there are two short tunnels between Gaerwen and Bodorgan, 420 and 115 yards long respectively having a short length of open cutting in between.

(To be continued.)

AN AMERICAN-BUILT MALLET LOCOMOTIVE IN MESOPOTAMIA.



By Courtesy] [*Lt. H. H. G. Scotter, R.E.*

Gauge	... ...	Metre.	
Cylinders	... ...	13 in. and 19 in. diam. 22 in. stroke.	
Coupled wheels	...	3 ft. 8 in. diam.	
Wheelbase, engine and tender	...	44 ft. 10½ in.	
Total weight in working order	...	71½ tons.	
Fuel...	... ...	Oil, Coal or Wood.	
Heating surface—			
Tubes	... ...	1,183 sq. ft.	
Firebox	... ...	125 sq. ft.	
Total	... ...	1,308 sq. ft.	
Grate area	... ...	13·3 sq. ft.	
Steam pressure	...	180 lb. per sq. in.	

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British Locomotive Practice and Performance.

By CECIL J. ALLEN.

Photo.] [*E. A. Gurney-Smith.*

LONDON, BRIGHTON & SOUTH COAST RAILWAY.

Brighton—Portsmouth train passing Lancing.
0-4-2 engine, No. 199, "Samuel Laing."

ALTHOUGH it is not possible at the time of writing to review all the summer time-tables, complete details of the improved services on several lines not being yet available, there is more than sufficient material in those of the full services which are already in operation to occupy the space available to me for comment. Head and shoulders above all other companies, in the magnitude of the changes effected, as much in respect of acceleration as of multiplication of trains, stands the South Eastern and Chatham Railway. Not only does the South Eastern and Chatham Railway summer time-table, which began to operate on June 16, embody, as the preliminary announcements stated, a reversion to "full pre-war train service," but in all directions there is a considerable advance on the facilities available before the war.

To the Kent coast it is now possible to leave by expresses at 9.10, 10.15, 10.45, and 11.30 a.m., and at 2, 3.15, 3.25, 5.5, 5.10, 6.15, 7, and 8.25 p.m. on weekdays, with corresponding trains on Saturday afternoons. Of these, the 9.10 a.m. and 3.15 p.m. cover the 74 miles from Victoria to Margate, non-stop, in 92 and 90 min. respectively, and the 5.5 p.m. is booked from Holborn Viaduct to Margate in 97 min., while the 10.15 a.m. and 2 p.m. run from Victoria to Westgate in 90 and 97 min., and the 11.30 a.m. and 7 p.m. from the same terminus to Whitstable, 58¾ miles, in 83 and 86 min. To take one town as an example, Margate before the war had 10 down expresses, or fast trains, daily, with an average journey time of 115 min.; the same number is still provided, but the additional trains (such as the 3.25 and 5.5 p.m.) serving stations from Whitstable to Westgate, and the separation also of the Canterbury and Dover services, have enabled the average time to be cut to 103 min. At the worst war period the only seven "fast" trains available averaged no less than 151 min.! The fastest pre-war time of 90 min. in each direction between Victoria and Margate is reinstated, at 3.15 p.m. down and 8 a.m. up, requiring an average speed of 49·3 m.p.h.; in view of the exceedingly severe difficulties of grading and the many service slacks *en route*, this run is fully qualified to rank as one of the finest in force at the present time. Up timings from the Kent coast do not give quite such good figures as those in the opposite direction, partly in view of the fact that slip coaches at

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Faversham on the east-bound journey enable the resorts between there and Margate to be served without stopping the down expresses concerned short of Margate.

Folkestone is equally well catered for. The new time-tables show down expresses at 10 and 11 a.m., 1.30, 3, 4, 4.30, 7, and 8.30 p.m., of which the 1.30, 4, and 7 p.m. (with the 8.5, 9.30 and 11 a.m. and 5 p.m. up) are all non-stop trains covering the 70 miles from Charing Cross in 90 min. This does not quite attain to the best pre-war figure of 83 min. from Cannon Street to Folkestone, although the difference is somewhat discounted by the extremely cautious running needed over the 1¾ miles between Charing Cross and London Bridge. Before the war, some 9 trains on the summer service took one to Folkestone in an average time of 110 min. (apart, of course, from the Continental boat trains). At the worst war period this was reduced to 5, and the average time increased to 149 min.; now, in two bounds, the 9 are restored, with an average journey time of 99 min. The same average obtains by 8 trains in the up direction, as against 7 averaging 116 min. before the war, and 6 averaging 159 min. at the end of 1918. It is significant, too, to note that all the up 90-min. expresses from Folkestone are allowed only 36 min. in which to cover the 36 miles from Sandling Junction to Tonbridge, passing in each case. Such improvements are really remarkable. The only feature of the Folkestone service that one is inclined to criticise is the *hiatus* in the down direction between 4.30 and 7 p.m., which used to be filled so admirably by the 6 p.m. summer express *ex* Charing Cross.

Hastings has now some faster trains than were ever run in pre-war days, as the best time has been cut to 1½ hours—uniformly with that to Margate and Folkestone—St. Leonard's, 61¾ miles from Charing Cross, being reached non-stop in 85 min., which is no mean achievement, in view of the heavy grades before Tonbridge and the exceptional difficulty of the road afterwards. In pre-war days, the best time to Hastings was 97 min., but this included a stop at Tunbridge Wells. The general acceleration on the Hastings branch, although pronounced, is not quite so exceptional in character as that already referred to in connection with the Kent Coast and Folkestone. Among other improvements may be noted the excellent service between London and the Kent capital—Maidstone—with six expresses in each direction daily, either non-stop or calling only at Bromley or Herne Hill. Another novelty is the

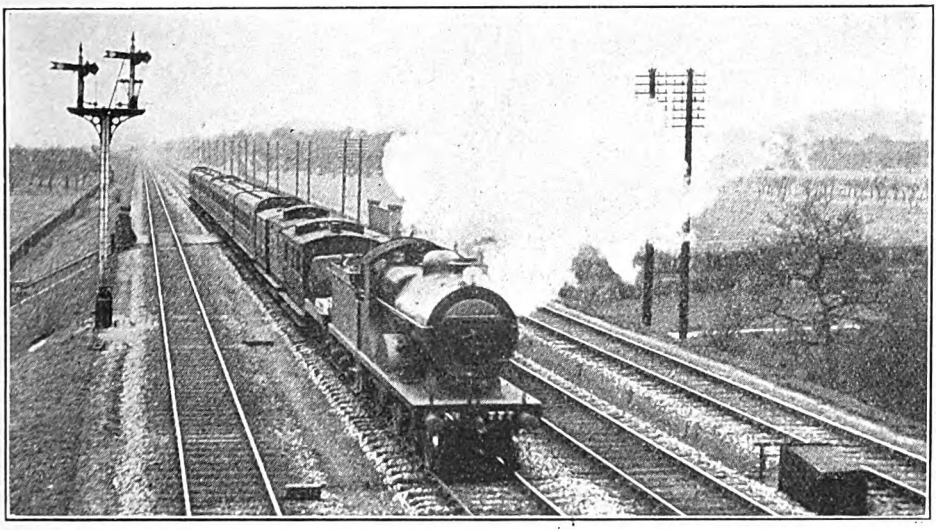

Photo.] SOUTH EASTERN & CHATHAM RAILWAY. [*P. S. A. Berridge.*

Down express train hauled by superheater 4-4-0 locomotive, No. 777.

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provision of Pullman cars on trains other than the Continental boat expresses, *e.g.*, to Folkestone and Ramsgate by two trains daily in each direction over these respective routes. Before the next issue, I am hoping to renew my acquaintance with the South Eastern and Chatham Railway, and I propose then to detail some timings of the principal new expresses.

Another somewhat startling time-table is that of the London and South Western Railway. This does not embody any actual improvement of the decelerated running times obtaining at the end of the war, but it is the first attempt made to schedule four down expresses leave at exactly even intervals—9.50 a.m., 12.50, 3.50 and 6.50 p.m. Restaurant cars are restored to this service, making a total of 22 London and South Western trains so equipped—4 to and from Portsmouth, 6 to and from Exeter, and 10 to and from Bournemouth, together with one in each direction on the Birkenhead—Bournemouth service, which once again is worked non-stop between Eastleigh and Oxford, but this year by Great Western locomotives. The chief feature of the new London and South Western time-tables is therefore multiplication and arrangement of trains,

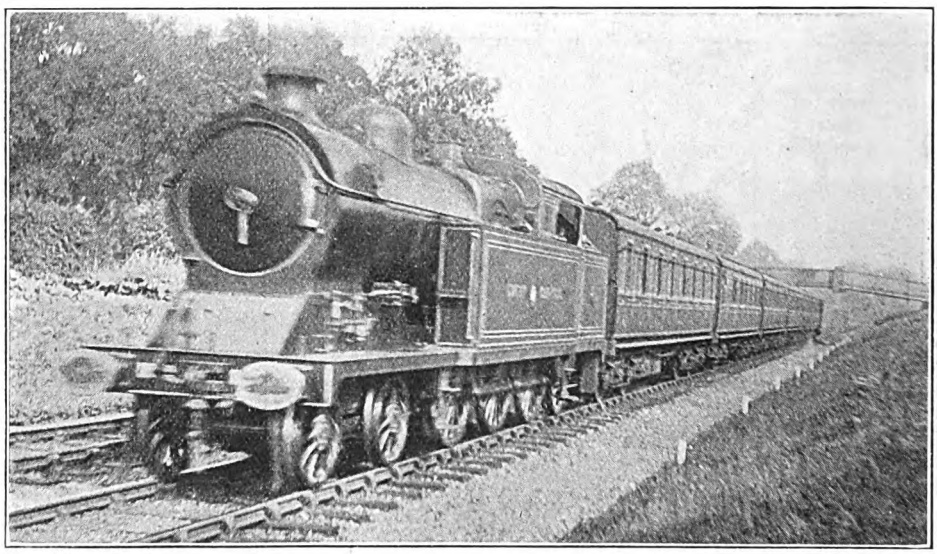

Photo.] GREAT CENTRAL RAILWAY. [*K. A. C. R. Nunn.*

Marylebone—Rickmansworth train near Pinner. Superheater 4-6-2 tank engine, No. 169.

a long-distance main-line train service at even hourly intervals, with a consequent large increase in the number of trains operating, especially on the Bournemouth service. Expresses now leave Waterloo for Bournemouth at 9.30 and 11.30 a.m., 12.30, 1.30, 2.30, 4.30, 5.30, 6.30, and 7.30 p.m., of which the 12.30, 1.30, 4.30, and 6.30 p.m. are non-stop to Southampton —the longest run—all uniformly in 103 min. It has not been possible, apparently, to preserve the even hours on the Exeter service, although it has been very nearly done by scheduling trains from Waterloo at 8 and 10.50 a.m., 1, 3, and 5.55 p.m. On the Portsmouth service, however, the rather than expedition, this being really an extension of the principle which has been developed so successfully in the suburban electrical services of this company. As yet, however, although there is an equally numerous service of trains in the opposite direction, it has not been found practicable to apply the hourly system on the up journey.

On the Midland Railway, the Manchester service alone has enjoyed any substantial speeding up, and even that is somewhat inconsistent, the 9.10 a.m. from Manchester to London, for example, covering the 99 miles up from Leicester in 123 min., with an intermediate halt at Welling-

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borough; while the 4.35 p.m. *ex*-Central—the other 4½-hours' up express—takes 12 min. longer from Leicester with no stop at all. Conversely, the latter train runs non-stop from Manchester to Derby in 88 min., while the former is allowed 12 min. longer to compensate for a 2-min. call at Miller's Dale. The 9.10 a.m. from Manchester is, of course, by far the most exceptional case of Midland acceleration, a later start of 10 min., and an earlier arrival by half-an-hour in London, giving a gross saving of 40 min. on the journey. Only 78 min. are allowed for the final 65 miles from Wellingborough to St. Pancras, restoring to the Midland time-table a booking of exactly 50 m.p.h., but of 8.50 a.m., 9.25 a.m. and 10 p.m. It might have been thought possible to run the re-introduced and welcome midday Scotch expresses—trains of very moderate weight—at something under 11 hours 10 min. (now 5 min. less) between London and Glasgow. The distance of 432 miles, *via* Nottingham and Sheffield, involves an overall average speed of 39 m.p.h. Again, the new train from Leeds to London at 9.40 a.m. hardly seems likely to command much patronage on the throughout journey when one can leave the neighbouring Central station by Great Northern Railway 5 min. earlier, and be in King's Cross ¾ hour earlier. It is even feasible to leave Sheffield by Great Central Railway 41 min.

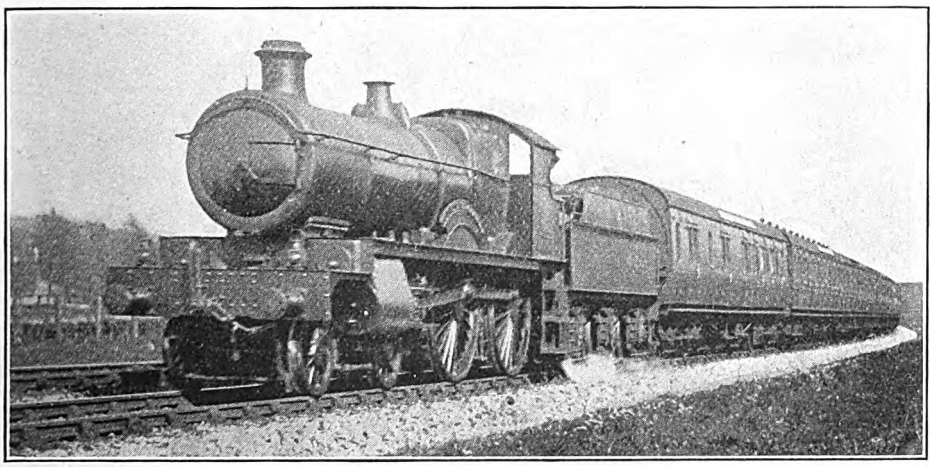

Photo.] **GREAT WESTERN RAILWAY.** [*W. Rich.*

Down express approaching Hungerford. 4-4-0 locomotive, No. 3808, "County of Limerick."

the train in question is, I believe, invariably piloted. Beyond these four 4½-hours' expresses—the two already mentioned in the up direction, and the 2.10 p.m. and 4.15 p.m. down, which have been expedited 15 and 25 min. respectively—the other trains on the Manchester service are only expedited from 5 to 16 min., and this is almost entirely between Leicester and Manchester, where the limits of maximum downhill speed have been raised.

On the main line proper the accelerations are negligible; in fact, one is somewhat at a loss to understand the reason for "accelerating" the up Scotch expresses, otherwise unaltered, by bringing them in at 8.47 a.m., 9.22 a.m., and 9.55 p.m., instead later than by this train, and reach Marylebone—after *seven* intermediate stops against one, a harder road, and 6½ miles further to go—only 25 min. later! There may, of course, be difficulties peculiar to the Midland Railway at the present time, with which the critic of time-tables is not conversant, but at the same time one cannot avoid the conclusion that, in proportion to the average loads hauled, the work at present required of Midland express locomotives is below the standards generally obtaining.

On the East Coast lines some notable accelerations have been made, principally in respect of the cutting down of the standard London—Edinburgh time to one

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of 9 hours. This means a reduction of 45 min. in the journey time of the 10 a.m. down; of 46 min. to Newcastle in that of the late 1.40 p.m., now starting at 1.20 p.m. and extended to Edinburgh—a much-needed improvement; and of 55 and 45 min. respectively in the schedules of the 7 and 10.30 (late 10.15) p.m. down night expresses, with similar changes in the reverse direction. The 10 a.m. and the two last-mentioned trains, by the way, have been running daily in duplicate for some time past. These timings involve average speeds of 46 to 48 m.p.h. between London and Grantham, and of 45 to 48½ between Grantham and York, and this with loads not infrequently approaching the 500-ton mark over a road having a number of long and trying gradients. And in this connection I feel bound to say, in contra-distinction to the remarks of the last paragraph, that in due consideration of the conditions just mentioned, the Great Northern Railway is at the present time putting up some of the finest locomotive work in these islands. I have occasion to use the line in question frequently, and have many more current timings of its expresses than I can find room to publish in these columns.

Three up trains on the Great Northern Railway Leeds service—the 9.35 a.m. and the newly restored 7.50 a.m. and 3.30 p.m. *ex*-Central, make the journey to London in 4 hours 20 min., but as yet no down train is altered to this figure, the fastest being the resuscitated 7.30 a.m. *ex*-King's Cross, with a throughout time of 4 hours 23 min. The principal novelty of the Great Northern Railway summer time-table is the reintroduction of the 1.40 p.m. down Harrogate express, with a through portion for Scarborough, and direct express connections to Bridlington, *via* Selby, and to Whitby. This seems likely to become an exceedingly heavy train at the height of the season, and still more so the corresponding up express, due in London at 5.30 p.m., which in addition to these extensive commitments, attaches at Doncaster a through portion from Hull. This will explain why no more rapid schedule has been given to the trains in question. Some of the point-to-point times now included in the Great Northern Railway time-tables are but little inferior to the best pre-war times of the heavier trains, as, for example, from Peterborough to London in 92 min. (at 5.48 a.m.), 93 min. (12.22 and 6.17 p.m.) and 94 min. (at 12.36 p.m.)—all of them very heavy trains. The 9.12 a.m. up on Mondays

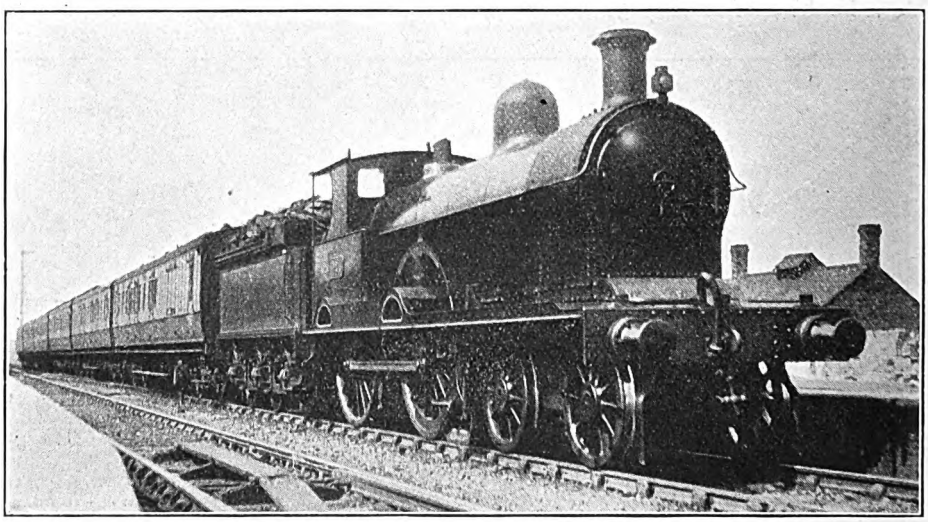

Photo.] LONDON & NORTH WESTERN RAILWAY. [*Leslie J. Thompson.*

1.35 p.m. train from Rugby at Blisworth. Simplified compound 4-4-0 engine, No. 1971, "Euryalus." (This locomotive was in the Irish Mail derailment at Weedon, 14th August, 1915.)

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and Fridays now runs to Finsbury Park, all but 74 miles, in 86 min. Such timings, again, as 18 min. start-to-stop from Grantham to Newark, 14·7 miles, want doing with so heavy an express as the 7 p m down night "Scotsman"; in fact, the timings of many of the shorter runs seem more difficult of maintenance than the longer non-stopping journeys, as, for example, the very smart intermediate bookings of the 8.45 a.m. *ex*-King's Cross.

Improvements on the North Eastern Railway consist mainly in the reinstatement of large numbers of trains on all sections, main and branch alike. The North Eastern Railway has now several

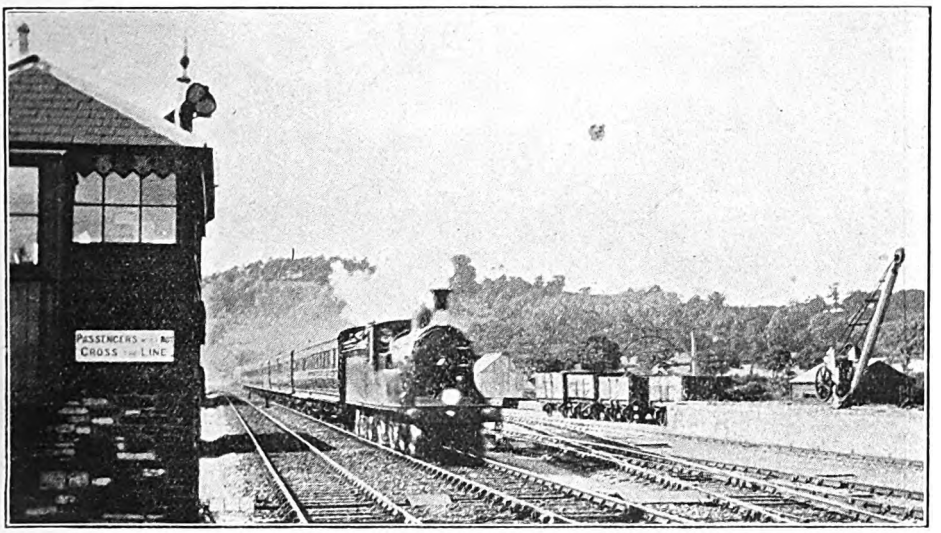

Photo.] LONDON & SOUTH WESTERN RAILWAY. [*E. A. Gurney-Smith.*

Up express from Plymouth passing Seaton Junction at full speed.

very smart timings, such as Scarborough to Malton, 21 miles, in 24 min. (this has operated right through the war), and to York, 42 miles in 50 min.; Darlington to Thirsk, 21·9 miles, and Thirsk to York, 22·2 miles, both in 25 min., by the same train; Northallerton to York, with the heavy morning express from Newcastle to London, 30 miles in 34 min.; and by the same train in the reverse direction at night in 32 min. But the last-named, as I have previously mentioned, is only a "paper" timing, and is neither possible, nor even attempted with such loads as are carried by the train concerned. With a 500-ton train, also, 53 min. from York to Darlington, and 52 or 51 min. in the reverse direction are not easy timings, and again, 81 min. from Newcastle to Berwick, and 80 min. from Berwick to Newcastle, are only 2 or 3 min. below the pre-war figures. The North British Railway has reinstituted almost a pre-war train service on all routes, and the long-distance timings are but little in excess of pre-war figures. There is an increase of only from 4 to 11 min. in the allowance of three of the principal expresses from Edinburgh to Aberdeen, for example. Sixty-minute timings are reintroduced in both directions between Edinburgh and Glasgow. At this stage I must leave the new time-tables, or performance will be ruled out altogether. The remaining lines shall be dealt with next month. "Dealt with" is perhaps a misuse of terms, though; it would need not less than a complete issue of THE RAILWAY MAGAZINE in which to deal in any sense adequately with the reconstruction time-tables, and it is thus impossible for me to give more than a few random impressions of the new times and trains.

Having travelled thus far in our time-table comments, it is quite fitting that we should "carry on," as promised in the last issue, with some North British Railway performance. A Rugby friend has furnished me

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with details of a couple of interesting journeys from Dundee to Edinburgh, with very substantial loads, timed at the period prior to the worst decelerations. The express concerned called at Leuchars Junction, Cupar and Kirkcaldy, between Dundee and Haymarket, and on the first occasion "Atlantic" No. 872, *Auld Reekie*, had a gross load of 335 tons, while No. 870, *Bon-Accord*, was at the head of a 340-ton train. *Bon-Accord* made the best running throughout. Smart times were made over the first stretch to Leuchars Junction, St. Fort, 4·6 miles, being passed in 9 min. 39 and 25 sec. (despite the 2 miles' rise at 1 in 74–114 on to the Tay Bridge, and the cautious running required over the latter), and Leuchars, 8·4 miles, was reached in 14 min. 40 and 20 sec., against a schedule start-to-stop allowance of 15 min. From Leuchars, again, there is a rising start of 2 miles at 1 in 160, but Dairsie, 3·2 miles, was passed in 6 min. 40 and 0 sec., and Cupar, 6·2 miles, was stopped at in 9 min. 37 and 12 sec., allowed 10 min. There is a still worse start from the last-mentioned town, consisting of ½-mile at 1 in 248, and 1⅜ miles at 1 in 101; then, after a level stretch from Springfield to Ladybank, comes Falkland Road bank, of 3⅜ miles at 1 in 95–111. Depite these hindrances, however, Ladybank, 5·5 miles, was passed in 8 min. 15 and 27 sec., and Markinch Junction, 11·4 miles, in 17 min. 5 sec. and 16 min. 57 sec. (my correspondent does not give the time of passing the summit point); after this, *Auld Reekie* was badly delayed by adverse signals, and took 15 min. 8 sec. for the ensuing 7·3 miles to Kirkcaldy, whereas *Bon-Accord* covered the same distance in 13 min. 10 sec., slacking carefully through Thornton Junction, and recovering somewhat slowly up the two subsequent miles at 1 in 135. Total times from Cupar to Kirkcaldy, 18·7 miles, were thus 32 min. 13 sec. (30¼ min. net) and 30 min. 7 sec., schedule being 30 min.

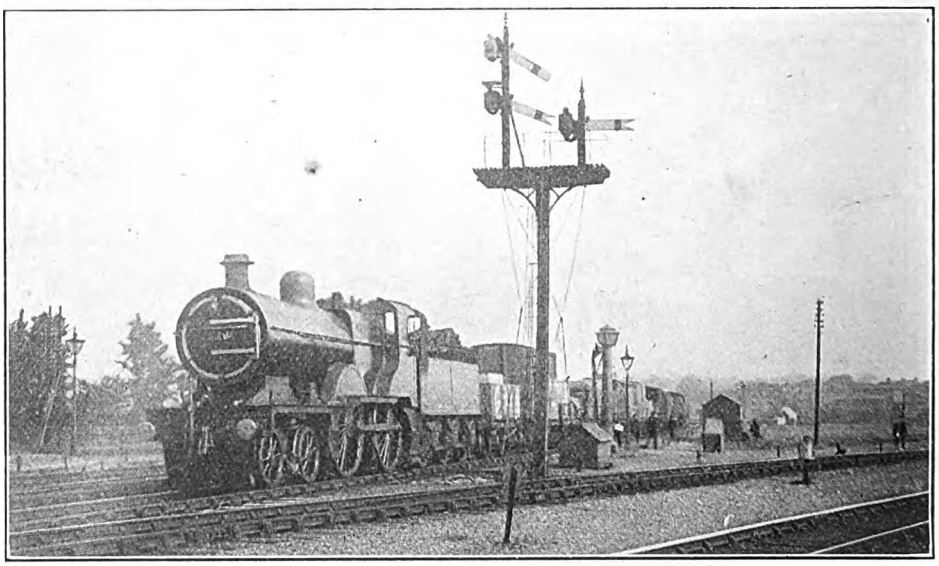

Photo.] MIDLAND RAILWAY. [*Chas. S. Lake.*

Goods train leaving Bedford yards on the main line. Superheated 4-4-0 engine, No. 528.

There is a good downhill start from Kirkcaldy, but the constant curves between Kinghorn and the south side of the Forth Bridge discount its value considerably. So the times to Burntisland, 5·8 miles, were 8 min. 2 and 11 sec.; to Inverkeithing, 12·8 miles, 18 min. 16 sec. and 17 min. 27 sec.; to Dalmeny, 16·4 miles, 26 min. 45 sec. and 25 min. 26 sec.; thence the 6 miles to Saughton were run briskly in 6 min. 2 sec. and 5 min. 51 sec. *Bon-Accord* was badly delayed by signal outside Haymarket, and took 4 min. 40 sec. over the last 2·4 miles, whereas *Auld Reekie*

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ran the same distance in 3 min. 8 sec., making totals of 35 min. 55 sec. and 35 min. 57 sec. (34½ min. net) for the 24·8 miles from Kirkcaldy, booked 37 min. Aggregate net running times from Dundee to Haymarket were thus 90½ and 88 min. respectively, against a schedule figure of 92 min., and although these may not appear unduly expeditious for a 58·1-miles' journey, in consideration of the heavy loads and the extraordinary difficulty of the route, the work performed was, in parts, quite good.

A more recent run, from another young friend, was on the present decelerated schedules, and had no features of note, as the load totalled only 260 tons. *Auld Reekie* was again the engine concerned. From Dundee, St. Fort was passed in 10 min., and Leuchars reached in 15 min. 3 sec.; from Leuchars to Cupar occupied 10 min. exactly. From the latter town, *Auld Reekie* got through Ladybank in 7 min. 55 sec.—the best feature of the run—but was checked by signal severely at Kingskettle; despite this the lowest speed on Falkland Road bank was 32 m.p.h. A permanent way slowing at Markinch Junction, and a further one before Kirkcaldy, with the usual service slack at Thornton Junction, made the gross time from Cupar to Kirkcaldy 31¾ min., but my correspondent estimates the net time at 27¾ min., which gave evidence of satisfactory work. From Kirkcaldy the running was only moderate, Burntisland being passed in 9¾ min., and Dalmeny in 29 min. 10 sec.; Haymarket was reached in 42 min. 40 sec.

Another correspondent sends a very carefully noted log on the 1 p.m. from Queen Street, Glasgow, to Edinburgh, the engine being one of the large 4-4-0 superheaters—No. 421, *Jingling Geordie*—and the load 291 tons empty, and 305 tons full. With the usual assistance in rear up Cowlairs bank, No. 421 passed Cowlairs, 1·6 miles, in 6 min. 45 sec., and Lenzie, 6·3 miles, in 14 min.; the 6·6 miles from Lenzie to Dullatur were run in 7 min. 35 sec., the 8·9 miles thence to Falkirk in 9 min., and the 7·9 miles on to Linlithgow in 7 min. 50 sec. After that the engine was eased, 11 min. 5 sec. being consumed on the 9·4 miles between Linlithgow and Ratho, and 9¼ min. on the final 7 miles to Haymarket. But the total of 58 min. 35 sec. for the 46·1 miles' journey was 1½ min. inside the schedule allowance, and the 44·5 miles from Cowlairs to Haymarket—virtually level throughout—were run in 52 min. 20 sec.

The remaining Caledonian run mentioned in the last issue was one on the 2.30 p.m. express from Aberdeen to Perth, allowed 115 min. for its non-stop journey of 89·8 miles, of which 5 min. is the time credited in the working book for

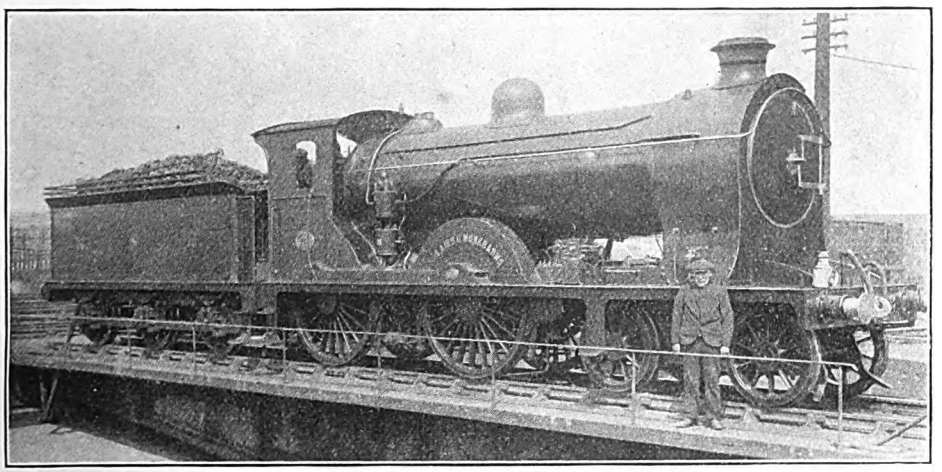

Photo.] NORTH BRITISH RAILWAY. [*Chas. S. Lake.*

Scott class locomotive, No. 412, "Laird o' Monkbarns" on turntable at East Field Running Sheds, Glasgow.

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the slow over the Tay Viaduct at Cargill. A light load of 34 axles, or 220 tons full, was taken, behind superheater 4-4-0 No. 116. The first 7 miles out of Aberdeen are very difficult, commencing as they do with ½-mile up at 1 in 96, which is succeeded, after 1½ miles at easier grades, by 5 miles at 1 in 102–164. On the 1 in 102 the lowest speed was 39 m.p.h., and No. 116 passed Cove Bay, 4·8 miles, in 10 min. 1 sec., and Portlethen, 8·2 miles, in 15 min. 3 sec. The 8 miles thence to Stonehaven, mostly falling, save for the sharp 1½ miles' rise from Muchalls, occupied 9 min. 52 sec. Up the steepest part of the 7-mile bank to Drumlithie—2 miles at 1 in 85–107—speed did not fall below 34 m.p.h., and Drumlithie, 7·1 miles from Stonehaven, was passed in a further 10 min. 10 sec. Inclusive of a slight signal check at Fordoun, the 7·3 miles on to Laurencekirk were run in 8 min. 12 sec., and the 8·6 miles thence to Dubton Junction in 10 min. 31 sec., speed not rising above 62½ m.p.h. Bridge of Dun, 41·9 miles from Aberdeen, was passed in 56 min. 40 sec., or 20 sec. inside time. The next stage of 8·5 miles to Guthrie includes a 3¾-mile rise at 1 in 96–143, and was covered in 11 min. 3 sec., while the faintly rising stretch of 6·9 miles thence to Forfar occupied 8 min. 53 sec. Good work was done after this, the slightly falling stretch of 12 miles from Forfar to Alyth Junction taking 13 min. 2 sec., with a maximum rate of 65½ m.p.h., and the 4·7 miles on to Coupar Angus 5 min. 23 sec. From Coupar Angus to Stanley Junction, 8·6 miles, including the Tay Viaduct slack, occupied 11 min. 53 sec., and from Stanley into Perth, 7·2 miles, 8 min exactly, making up a total of 114 min. 54 sec. from Aberdeen, or practically dead time. It is doubtful whether the Cargill caution cost more than 3 min., but the difference between this and the 5 min. allowance may be offset against the signal check at Fordoun, earlier in the journey.

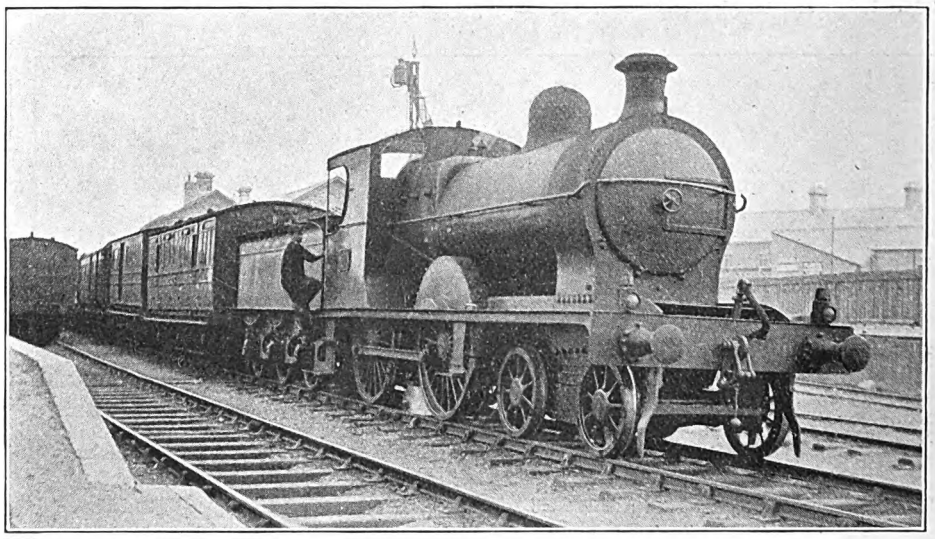

Photo.] DUBLIN & SOUTH EASTERN RAILWAY. [*D. B. Bradshaw.*

Wexford—Dublin Mail Train at Greystones. 4-4-0 locomotive, No. 58, "Rathdrum."

In conclusion I will hurry south, and describe a couple of runs on the accelerated Midland Manchester—London service—one on the morning 4½-hour express at 9.10 a.m. *ex*-Central, and the other on the afternoon train at 4.35 p.m. The two runs were complementary to each other, in that the first was very poor in its early stages, and greatly improved south of Derby, whereas the second was good to Derby and very feeble thereafter. Curiously enough, also, the indifferent running was in both cases made by Johnson 4-4-0 engines of Class 3, while the good parts of both runs were achieved by

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compounds. On the morning train out of Manchester our engine was No. 743, Class 3, and the load 36 axles, weighing 229 tons empty and 245 tons full. Easing over Throstle Nest Junction we ran to Withington, 5 miles (where the conditional stop was made) in 9 min. 55 sec. Restarting, we were pulled up by signal just south of Cheadle Heath, this 2·9 miles taking 7 min. 40 sec. Then followed a deplorable exhibition, as, after a 75 sec. stop, we were unable to rise above 28½ m.p.h. on the 7¼ miles at 1 in 100–132 to Gowhole, and emerged from Bugsworth Tunnel at 27½, while the 1 in 90–95, which extends for 8½ miles up to Peak Forest, brought us down to 21 m.p.h. Consequently the 11·8 miles from Cheadle Heath to Chinley took 26 min. 55 sec., and the 5·7 miles thence to Peak Forest 15 min. 5 sec. With a time of 6 min. 40 sec. for the 4·6 miles on to Miller's Dale the total from Manchester was thus 68¼ min., instead of the 58 min. allowed. We did, however, contrive to keep time from Miller's Dale to Derby, covering the 9·8 miles from the start to Rowsley in 12 min. 10 sec., with a maximum of 67 m.p.h.; the 4·4 miles from Rowsley (passed at 45 m.p.h.) to Matlock in 5 min. 20 sec., and the 6·8 miles on to Ambergate, where we reduced to 30 m.p.h., in 7 min. 55 sec.; while the final 10·3 miles into Derby occupied 14 min. 5 sec., with a signal check before stopping. We had, therefore, covered the 31·3 miles from Miller's Dale in 39½ min., or 38½ min. net, schedule being 40 min., but at least 6 min. of the loss from Manchester to Miller's Dale must go against the engine, even after allowing for the extra stop at Cheadle Heath.

No. 1016, 4–4–0 compound, did far better than this on the afternoon train with a 220-ton load, although, strangely enough, we were stopped again on this second run at Heaton Mersey, in order to allow a local to cross our path from the Stockport direction. The 6·9 miles from Manchester to Heaton were run in 11½ min., start-to-stop, and the stop itself lasted 15 sec. So it took us 14 min. 40 sec. to pass Cheadle Heath, 7·9 miles. Accelerating to 41½ m.p.h. on the brief 1 in 200 "breather" in the ascent at Hazel Grove, we maintained 40 right up the 1 in 132 through Bugsworth Tunnel, and only fell very briefly to 38 at the south end. On the long and steep succeeding stretch we never fell below 30 m.p.h., until we were very severely checked on account of a slip in the bank immediately south of Dove Holes Tunnel. At this point we were doing 31 m.p.h., but reduced to 15,

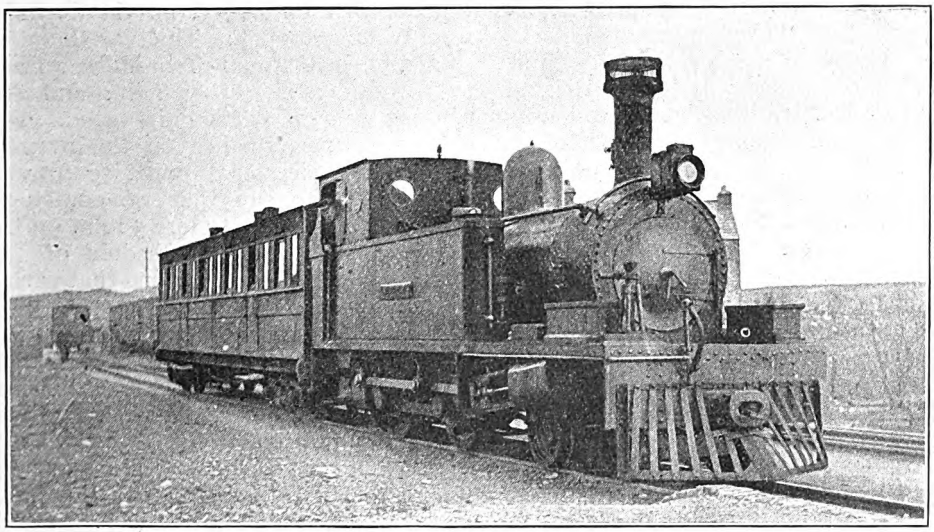

Photo.] SCHULL & SKIBBEREEN RAILWAY. [*D. B. Bradshaw.*

4-4-0 tank engine, No. 3 "Kent," at Schull. Gauge, 3 feet.

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although we afterwards accelerated on the 1 in 90 in the tunnel to 26 m.p.h. So Cheadle Heath to Chinley took 18 min. 50 sec., and Chinley to Peak Forest, check included, 13 min. From Peak Forest to Miller's Dale we ran cautiously in 5 min. 10 sec.; from Miller's Dale to Rowsley, where we slacked in this case to 30 m.p.h., 9¾ min.; from Rowsley to Ambergate, also passed at 30 m.p.h., 13 min. 25 sec.; and from Ambergate into Derby 12 min. 20 sec. This made our total time for the 61·3 miles from Manchester 87 min. 10 sec., schedule being 88 min., but the extra stop and the permanent-way delay must mean a net time not exceeding 82 or 83 min. The uphill work, indeed, was exceedingly good, and no higher speed than 67 m.p.h. was reached on the falling grades.

From Derby to London the two trains were taken on respectively by superheated compound No. 1001, whose load was raised to one of 48 axles, 303 tons empty and 325 tons full, and No. 715, Class 3, whose train was slightly increased to 235 tons. Sheet Stores Junction, 8·7 miles, was passed in 12 min. 25 and 0 sec.; Loughborough, 16·9 miles, in 21 min. 30 and 50 sec.; Syston, 24·7 miles, in 30 min. and 31 min. 35 sec.; and Leicester, 29·4 miles, was reached in 35½ min. and 37 min. 35 sec. The compound, therefore, gained 1½ min., whereas the simple, which started well, but ran very poorly afterwards, lost ½ min. From Leicester—somewhat unnecessarily it seemed to me—we received a pilot with the heavier load, in the shape of No. 652, an old "single-driver," and started excellently, running at 52½-54 m.p.h. all the way up the ascent to Kibworth, and touching 70½ m.p.h. beyond East Langton. So we passed Kibworth, 10·2 miles, in 14 min. 5 sec., and Market Harborough, 16·2 miles, in 20 min. 5 sec. Here speed was reduced with exemplary caution to 30 m.p.h., and thus handicapped at the start, we fell to 36½ m.p.h. on the 1 in 132 of Desborough bank, taking 8 min. 10 sec. for the 4·8 miles' climb. A very moderate descent followed, with no rate higher than 67 m.p.h., and a pronounced slack through Kettering (to 48 m.p.h.); so Desborough to Kettering, 6·1 miles, took 6 min., and Kettering to Wellingborough stop, 6·9 miles, 7½ min. This gave a total of 41¾ min. for the 34 miles from Leicester, allowed 43 min. Restarting, we maintained 31 m.p.h. up the 1 in 120 of Irchester bank, but did not exceed 69 on Sharnbrook descent, taking 12 min. 25 sec. to Sharnbrook, 8·3 miles, and 19 min. 35 sec. to Bedford, 15·2 miles. Here again we slacked severely to 45 m.p.h. The 8 miles on to Ampthill took 10 min., with a minimum of 45½ m.p.h., and the 11·5 miles thence up to Luton 14 min. 5 sec.; the undulating 10·4 miles on to St. Alban's were covered briskly in 10¼ min., with a maximum of 64½ m.p.h., and the 13 miles thence to Hendon in 13 min. 25 sec., with a maxima of 67 m.p.h. at Radlett and Hendon, and a minimum of 46 m.p.h. at Elstree. The last 7 miles into the terminus took 9 min. 5 sec., making a total of 76 min. 25 sec. for the 65 miles from Wellingborough. Time was therefore gained on each stretch from Miller's Dale, to a total extent of 5¾ min., and the running was in parts quite good. But over 715's performance on the evening train from Leicester I prefer to draw a veil; suffice to say that we contrived, with only one check, to lose 5 min. on the extraordinarily sluggish schedule of 135 min. for 99-miles' journey, and that with a load of only 235 tons.

I wonder, by the way, how many readers have noticed an amusing error whch has enlivened the Midland pages of "Bradshaw" for some months past. Midland public time-tables now only give one time, to serve as both "arrival" and "departure," to each train at all but the most important intermediate junctions. "Bradshaw," however, retains its old arrival and departure times at such intermediate junctions as Wellingborough, Kettering, Codworth, and Normanton, and gratuitously allows every train a stop of 2 min. at such places. Thus the 8.30 a.m. from Nottingham to London, which reaches Kettering at 9.43 a.m. (although page 473 says 9.45 a.m.) is duly shown to leave at 9.45 a.m., and to reach St. Pancras at 11.30 a.m. But the 8.5 a.m. from Derby, despite the 5 min. handicap involved in a start from Kettering at 9.50 a.m., pursues its Nottingham rival with such vigour—on the same line of metals—that the result is a "dead heat," the Derby train also dashing into the terminus at 11.30 a.m. The somewhat simple explanation is that *both* trains leave Kettering at 9.50 a.m. behind the *same* engine!

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THE INSTITUTION OF ELECTRICAL ENGINEERS.

MR. ROGER T. SMITH.

Electrical Engineer, Great Western Railway.

SINCE the late Mr. Spagnoletti, who like the subject of this note was a Great Western Railway officer, Mr. Roger T. Smith is the first railway electrical engineer to be elected President of the Institution of Electrical Engineers. In Mr. Spagnoletti's time it was known as the Society of Telegraph Engineers and Electricians. Mr. Smith received a scientific training between 1880 and 1885 at the University College, London. He was awarded the General Certificate in Mechanical Engineering, and obtained the Clothworkers Company's Exhibition in Physics. He took the degree of Bachelor of Science, University of London. Following experience at Leeds, Mr. Smith went to India and to South America. Afterwards he was in charge of the electric railway, power and lighting scheme for the Great Western Railway, and in 1905 joined the service of that company as its electrical engineer. Since then he has designed and carried out a vast amout of valuable electrical work for the Great Western Railway docks, goods stations, bridges, offices, hotels, &c.

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The Work of the Military Forwarding Department with the B.E.F.

By FRANK GILBERT.

ONE of the most important and, at the same time, least known, departments of the Quarter-master-General's branch with the British Expeditionary Force was that controlled by the Military Forwarding Officer.

There must be a large number of people who have handed in at British Railway stations, parcels over postal weight (11 lb.) marked "per M.F.O.," who have wondered what those initials stood for and by what means their parcel, consigned to a soldier serving with an Expeditionary Force, reached its destination.

The Army postal system quickly became familiar, but, except for a brief reference by "Eyewitness" in the early days of the war, no real account of the work of the M.F.O. and his department has ever been published.

In the early days of September, 1914, the public was informed by the Press that consignments of comforts, over 11 lb. and under 56 lb., for members of the B.E.F. could be sent, carriage paid by rail to the M.F.O., Southampton, and simultaneously an officer and four clerks recruited from British railways (the Lancashire and Yorkshire and London and South Western Companies provided this nucleus) sailed for Nantes where a depôt was opened for the reception and despatch to the Front of goods shipped to France by the M.F.O., Southampton. A similar depôt was opened at St. Nazaire and it will be remembered that the L. and S.W. Railway Company ran their cross-channel steamers "Normannia" and "Hantonia" there for a short period when Havre was closed.

Presently, when the danger to Paris was averted and the lines of communication could be re-established, the principal base was centred in Havre, and the depôts at Nantes and St. Nazaire were removed to that port.

It was found that over 10,000 parcels had arrived on the quay side and the M.F.O. set to work to provide as rapid and safe a service to railheads as was possible under the circumstances prevailing at that time. The B.E.F. was moving to the North of France from the Marne and the Aisne, and it was difficult to learn exactly the location of any particular unit—much more of any particular soldier.

But good railway experience, backed up by commonsense, military information and hard work, triumphed, and the people at home were cheered to hear that their boys were receiving large consignments of cigarettes, tobacco, chocolate and general comforts.

In October, 1914, reinforcements for the M.F. Department arrived from England, recruited by a sub-committee of the Railway Executive Committee. Six officers and a number of clerks were sent to the railheads to receive the loaded wagons sent from the base and hand over the contents to the units served from the railheads. The remainder of the clerks put their efforts into extending the organisation at the base. Special sections were begun to deal with:—

(*a*) Disposal of parcels received at the Base as undeliverable, owing to wrong, incomplete or missing address, or through consignee becoming a casualty.

(*b*) Equitable disposal of all "comforts" received from England marked "For the Troops"—no particular unit being indicated.

(*c*) Parcels for units which could not be reached by the ordinary divisional trains to railheads. In these cases the goods had to be consigned to a French Railway station and handed over to the Chemin de fer de l'Etat for despatch as ordinary commercial traffic.

(*d*) Registration and reply to all enquiries received as to the disposal of goods shipped from England by M.F.O., Southampton.

(*e*) Purpose of locating every unit in the B.E.F. to ensure that all goods sent by the M.F. Service were forwarded to correct destinations.

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These sections expanded and others were added as the volume of traffic grew, and fuller reference will be made to them further on.

In November, 1914, the M.F.O. was made responsible for the despatch of non-effective officers' kits to England, and a special warehouse—apart from that for handling goods for the B.E.F.—was opened to receive from the Front and ship to England all officers' kits consigned to the Baggage Officer, Southampton, or Messrs. Cox and Co., London. The importance of this work can hardly be exaggerated, and it was found necessary, later on in November, 1914, to open another kit warehouse at Boulogne.

The work at the latter port quickly expanded, and one of its most useful features was the handling of newspaper traffic. It must be explained that the War Office—recognising the need of reading matter as a "mental ration"—arranged to send daily a supply of the principal newspapers in bulk to the A.M.F.O., Boulogne. These papers arrived at the French port by the first mail steamer each day from Folkestone, and the A.M.F.O., Boulogne arranged for their unloading from the boat, counting, sorting, packing, labelling and distributing in assorted parcels, according to the strength of the different units. The papers were sent up first of all, with the daily supply trains to railheads and distributed with the rations through the usual A.S.C. channels. But a more expeditious service was found by means of the R.E. postal service, and the A.M.F.O., Boulogne, therefore handed over the parcels, counted and assorted, to the A.D.P.S., who sent forward by a specially arranged lorry service.

In many cases newspapers were received by units on the day of publication, and the appreciation by the troops of the arrangements justified their continuance throughout the war.

At the beginning of December, 1914, a need became evident for a quick, safe and careful service for the despatch of inter-departmental goods. These included stores such as were used by Red Cross, R.E. Works, R.E. Signals, Army Printing and Stationery Service, and Veterinary units, and the M.F. organisation was adapted to handle this traffic.

The various services and departments who despatched stores, as mentioned, had not always sufficient traffic to warrant loading their own wagons, and one of the principal objects of the M.F. Department was to combine these "smalls" so as to form complete wagon loads for all destinations. A quicker and more reliable service to all parts was accordingly offered by the M.F.O. for all small goods. A.S.C. supplies and A.O.D. issues were of such immense quantities as necessitated special trains and these "pack" trains were always made up to include one or more M.F. wagons of mixed goods.

On December 19, 1914, a special train conveying the first consignment of Christmas puddings left Havre for the Front. It will be recalled that through the generosity of readers of the *Daily News* and *Daily Telegraph* a half of pound of Christmas pudding was issued to every man, and it speaks well for the organisation of the M.F. Department when it can be said that every member of the B.E.F. received his ration. The Commander-in-Chief was greatly pleased by the arrangement and caused a special message of congratulations to be sent to the staff concerned.

In 1915, the work of the Department rapidly extended over Northern France. Depôts were opened in all the principal railway and British military centres and the M.F.O.'s Headquarters were removed to Abbeville, the big Nord railway junction and a much more central spot than Havre. Here the M.F. Department came under the supervision of the Inspector-General of Communications. Large numbers of men from the British railways—recruited as sappers in the Royal Engineers—arrived from Longmoor in April, 1915, and were posted to the various stations under the local or district A.M.F.O.—officers commissioned from British railways to the General List.

The growth of the B.E.F. by the addition of Colonial units and the "First Hundred Thousand" caused the adoption of new schemes to ensure accurate forwarding to correct units of all goods handled and "Repacking Depôts" were opened at the principal regulating stations.

It must be remembered that the B.E.F. was an exceedingly elastic and mobile organisation. Units and individuals were constantly joining, leaving and moving,

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and it was not always possible to learn of the change of a unit before goods for that unit had been forwarded from the Base.

Parcels were loaded at Havre into a wagon for the Division in which the consignee's unit was included, and the wagon would go, first of all, to the Repacking Depôt, where a complete "Order of Battle" was maintained—kept up to date daily by information supplied from M.F.O. Headquarters. The contents of each wagon being checked by this record (kept in card index form) it was made easy and possible to correctly consign packages to every destination and to correct any errors in loading, due to movements of units during the journey of the wagon from the Base. If the parcel in question was "O.K.," it would go forward direct to railhead and if a correction was necessary it could be made and the goods re-despatched the same day.

This system of Repacking Depôts went a long way towards effecting economy in wagon stock, and each Repacking Depôt gave a direct service to and from a certain number of railheads (this number being dependent upon the scope of the regulating station at which the Repacking Depôt was situated), and to all other Repacking Depôts and Bases. Four Repacking Depôts were established—at Romescamps near Abancourt, at Abbeville, at Outreau near Boulogne, and at Fontinettes, Calais.

On a British railway this system would not be necessary as consignees' addresses do not change whilst goods ordered for them are in transit. For example, Jones and Co. of Manchester is always at Manchester, and goods can be consigned to Manchester station, but a battalion of infantry or battery of artillery were never long in one place and their movements had to be reckoned upon when goods for them were sent by rail.

Another point was that secrecy in troop movements had to be strictly observed, and a confidential set of specially designed labels for use on the wagons to denote destinations without advertising contents and definite locations, was introduced.

On July 1, 1915, the control of the M.F. Department was transferred to the Director of Railway Transport, and closer railway working resulted. In October, 1915, when the flow of troops and material to the East began to be heavy, a M.F. Depôt was opened at Marseilles, and all small military stores passing through the Mediterranean Port, to and from the Expeditionary Forces in Macedonia, Egypt, and Mesopotamia, were handled.

At the beginning of 1916, the first consignment of "Comforts" sent out by the newly-organised department of the Director-General of Voluntary Organisations in England, was received at Havre. The whole of the work of distribution to units, based on their feeding strengths and needs, was undertaken by the M.F. Department. Indents for comforts were received from units by the A.M.F.O., Havre, who registered and classified them, and as the goods to meet these requirements arrived from England, each unit was supplied in rotation, and an advice of despatch sent to the Commanding Officer concerned.

By this means wastage and unfair distribution were avoided, and when stocks became low at Havre the D.G.V.O. was asked to send out further replenishments.

Another section which necessitated very careful and detailed working was that for handling all sick and wounded men's effects. These were received by the A.M.F.O., Havre, checked, inventoried, recorded, and despatched to the home depôts, the D.A.G., G.H.Q., 3rd Echelon, or to O.Cs. units, according to each individual case and instructions received from time to time.

The handling of the kits of deceased, sick, and wounded officers, as well as the surplus kits of effective officers, was developed by the M.F. staff until it became a fine art. Every precaution was taken to guard against loss in transit, special sacks to contain the valises, &c., and specially locked baggage boxes of the South Eastern and Chatham Railway's cross-Channel steamers being employed for the purpose.

The M.F. Department performed a distinctly useful service in instituting a very efficient system of tracing officers' kits lost whilst travelling on the railways in France. Many officers, through illness, unacquaintance with French railway methods or geography, or having to attend to large bodies of troops on the move, arrived at their destinations without

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their kits. By arranging for all A.M.F.Os. and R.T.Os. at all points throughout France to send in daily to the A.M.F.O., Boulogne, a complete list of all kits on hand without account, and by concentrating all enquiries (made on a specially designed printed form) at Boulogne, connections between a kit lost, say, at Amiens and found at Paris in a cloakroom, ownerless, could be made, and instructions given to the A.M.F.O., Paris, to send the kit on to its owner.

The expenditure of a large amount of public money on claims for kits lost through no fault of the owners, was avoided by the M.F.O.'s "Lost Kit Section," and numerous officers were made happy by the finding of their property.

The establishment of Expeditionary Force canteens and Y.M.C.A. huts at all the rest, reception and reinforcements camps, and at all the chief stations of the B.E.F., brought large consignments of goods for sale at those canteens and huts to supplement rations and to provide additional comfort for the troops, and the M.F. organisation was utilised to forward the many tons of groceries, tobacco, books and sports outfits, &c., received at the base ports.

The goods were received from the ships and conveyed by motor transport from quayside to the M.F. Depôt (which, at Havre, was situated in the vast Hangar-aux-Cotons). Here they were sorted into divisional, corps, unit, and base order, entered up on specially printed waybills, and loaded into wagons together with other goods of local origin, *e.g.*, parcels of stationery, from the A.P. and S.S., cases of Red Cross and veterinary implements, splints and dressings, boxes of R.E. telephone equipment, &c. The wagon would be appropriately labelled to the repacking depôt serving the corps, division, or base concerned, and, at the repacking depôt, re-checked, sorted and re-consigned to final destination.

In the case of a railhead, the goods would be checked with the waybills accompanying them, and handed over to the divisional supply column working at the railhead, a signature being obtained by the M.F. clerk. The D.S.C. then transported the goods, together with the day's rations, to the refilling point, whence they were collected by regimental transport and taken to unit headquarters.

Any discrepancies on arrival of goods at railhead or base were reported to M.F.O. headquarters, where a special section established there investigated all cases of loss or damage to goods in transit by the M.F. Service. Pilferages could thus be easily detected and precautions adopted to prevent them. One of these devices was the use of special code padlocks on the wagon doors, and another was a special seal of the "Tyden" pattern—a tape, self-locking seal marked and numbered. Considering the valuable nature of the goods, the difficulty in securing and guarding wagons, and the war conditions prevailing in Northern France, the absence of loss and damage to goods handled by the M.F. Department was remarkable.

The "Query" Section at Havre deserves a special article of its own, but it must suffice here to give a brief outline of its scope. Through numerous and various causes —ranging from the death of a consignee to insufficient addressing—parcels were constantly received back at Havre from the "Front," as undeliverable. Each parcel was recorded on receipt, and its case specially investigated. If consignee had been wounded, his movements subsequent to admission to the Field Dressing Station would be obtained, and the parcel sent on to him when he was definitely located. If he had been transferred to another unit, details of the transfer were sought and the parcel re-forwarded to his new address as soon as practicable. In cases where the address given on the parcel had been effaced, was manifestly insufficient, or so inaccurate as to render void all reasonable efforts to trace the owner, the parcel was examined by an A.M.F.O., and the address of sender ascertained, a letter being sent, asking for fuller and more detailed information to enable delivery to be effected.

A large correspondence was essential in this department, and the number of complimentary letters received from the public by the A.M.F.O., Havre, showed how much this very thorough attention to every detail was appreciated. The letters received by the M.F.O. Headquarters, inquiring disposal of particular packages, could always be satisfactorily answered, for the system which had been built up

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enabled the signature given to the M.F. Department for every package handed over to a divisional supply column, unit, or individual, to be quoted as clear evidence that it had passed safely in transit from sending point to rail destination.

One important section of the department was established in Paris, and the A.M.F.O. there also supervised the M.F. staff attached to the Independent Air Force. The surprisingly rapid growth of this force, and the large area over which its operations extended, necessitated considerable organisation and when it closed down in November, 1918, the A.M.F.O., Paris, began to handle a great traffic in supplies for the Peace Conference, just beginning its preliminaries.

The M.F. Staff was principally composed of British railwaymen, with labour parties of "Category C" men, Chinese and Egyptian natives, and occasionally of German prisoners. At the beginning of 1919, the number of permanent staff employed was in the region of 500. Almost the whole of the work was technical, and the pre-war experience of the officers and N.C.Os. proved exceptionally valuable.

For the past three years the M.F.O. was Major C. L. Macdona, O.B.E., and his chief assistant was Major H. M. Lees. The M.F.O. worked under the immediate control of Brigadier-General Sir V. Murray, K.B.E., the Director of Railway Traffic, B.E.F., and the growth of the department since it first began operations in September, 1914, showed steady expansion and development up to the time of the Armistice. Private parcels had diminished, by reason of the fact that many men who had sent parcels in 1914 and 1915, were themselves serving in the Forces in later years. The supply of comforts also became proportionately less, but the M.F.O. took over the forwarding of special kinds of stores, *e.g.*, Ministry of Munitions traffic to and from England (chiefly raw materials and finished instruments), R.F.C. and R.N.A.S. (later R.A.F.) engines for aeroplanes, A.S.C. (M.T.) stores and anti-aircraft equipment.

MAJOR C. L. MACDONA, M.F.O., AND PERSONAL STAFF AT GENERAL HEADQUARTERS.

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The total weight in tons of these "special" traffics rose from 13 in January, 1915, to 6,036 in July, 1917, while the number of parcels handled in the same months was 48,303, compared with 552,838. In December, 1917 (including Christmas traffic), over 609,000 parcels were forwarded, of weights varying from 11 to 56 lb., with occasional cases of half a ton or so.

With the advance of the armies into enemy country in November and December, 1918, the M.F. clerks at railheads and the forward areas, under the control of the A.M.F.Os. attached to the Army Headquarters, moved forward, and the depôts were established in several German towns, principally at Cologne, and at the chief railway centres in Belgium. The M.F. base at Havre moved up to Vendroux, near Calais, and it appears likely that so long as the British Army keeps its watch upon the Rhine, the Military Forwarding Department will continue to carry on its useful functions with all the success that attended them during the difficult period of the war, for which they were primarily created.

RAILWAY EXECUTIVE COMMITTEE.

Photo] [*Topical.*

MR. G. H. WHEELER,

Secretary.

IN succession to Major Gilbert S. Szlumper, as Secretary to the British Railway Executive Committee, Mr. G. H. Wheeler has been appointed. Mr. Wheeler entered the service of the London and South Western Railway in the office of the then Superintendent of the Line, the late Mr. G. T. White, in June, 1897. On the outbreak of war he was transferred to the Military Department concerned with the movement of troops and supplies. In June, 1917, he was appointed assistant to Major Szlumper.

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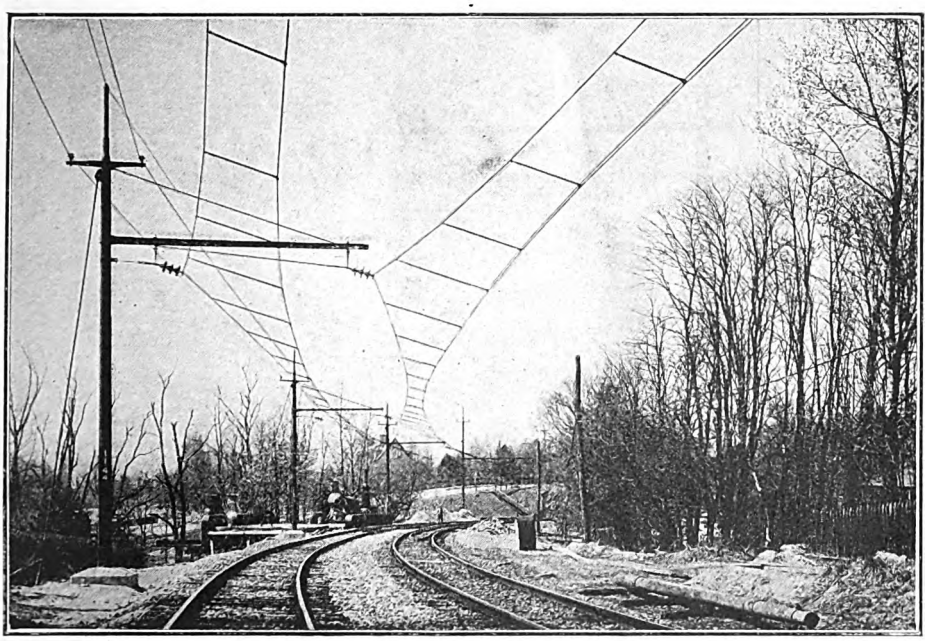
A Peep into the Future.

ELECTRIC TRACTION.—No. I.

By C. SYLVESTER, A.M.I.E.E

ELECTRIC traction in the future will be a very different proposition from that of the past. It will be necessary for the attention of the best electrical engineers in the country to be concentrated upon what is undoubtedly a problem before it will be efficiently solved.

There are other factors than the design and construction of more efficient traction equipment. Power-house equipment, now that we can fit turbo-generators of at least 20,000 kw. capacity, will not be a difficult proposition, although the selection of sites of the super power-houses will require careful consideration. But present-day substations and their equipment cannot be looked upon as anything but temporary expedients of the period, when compared with those which will be erected to supply current up and down complicated heavy-traffic sections of railway.



OVERHEAD SYSTEM ON A CURVE.

Although considerable attention will be given to the choice of the system of supply, whether A.C. or D.C., the most important problem will probably be the method adopted for transmitting power from the power houses to the substations attached to them. One thing is certain: whatever system is adopted, it will have to be absolutely reliable. That is, there must be a minimum risk of breakdown, as that will mean serious delay in traffic and cause considerable loss and inconvenience throughout the country. When one refers to the probable breakdowns to

Illustrations in this article are views on the Pennsylvania Railroad Electrified Line.—ED.

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transmission lines, it may be said that these are likely to be as follows :—

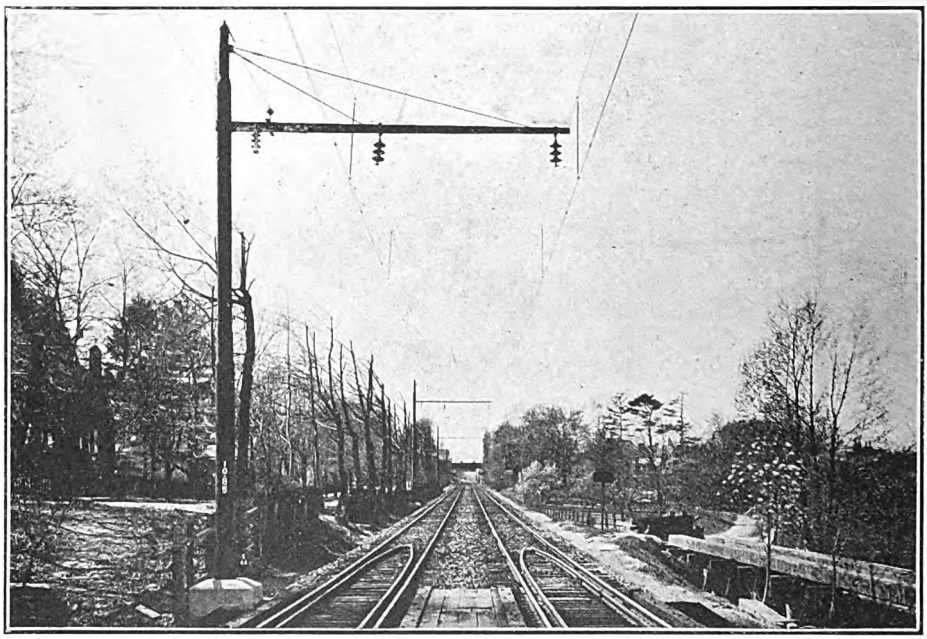
(1) *Overhead transmission lines.*—Breakage in lines. Failure of insulators. Failure of line towers through landslips, weather conditions, &c.

(2) *Underground mains.*—Insulation of cables giving out through the movement or settling of the ground, thus placing a strain upon the cable, which eventually breaks down the insulation.

Referring to the second item, it may be pointed out that although underground cables are extensively used in the present-day electrification schemes, it is doubtful whether they can yet be considered an entirely practical proposition for use throughout the country. When one travels from, say, London to Carlisle, any time during the winter or wet weather, it is common to see fields and meadows covered with water, sometimes to a depth of several feet. Under these conditions it is quite apparent that underground cables may easily be subject to special faults. Even though the cables were laid in strong concrete ducts, they would not remain uninjured for long. The water-soaked ground round the ducts would not provide sufficient support for them, so that they would eventually collapse. From this it is apparent that the overhead transmission line system will be the ideal system to adopt. Even here, however, considerable difficulties will present themselves, which will require careful judgment to overcome.

In sparsely-populated countries, such as America, there is usually no difficulty in choosing a direction for the lay-out of poles or towers for the support of high-tension transmission lines. In this country, however, the chief point to bear in mind appears to be the choice of route involving the least constructional difficulties, such as the crossing of marshes, rivers, canals, and occasionally mountain ranges.

In some parts of the country, such as Wigan, Manchester, and other densely-populated districts, it would appear that underground or semi-underground cables may be used with advantage. The overhead transmission lines would probably terminate in a substation, situated near the edge of the town or city, and from thence by underground mains to the substations, where the high-tension current would be transformed down to a suitable



CATENARY SUSPENSION BRIDGE HANGER WITH LOCKE INSULATORS.

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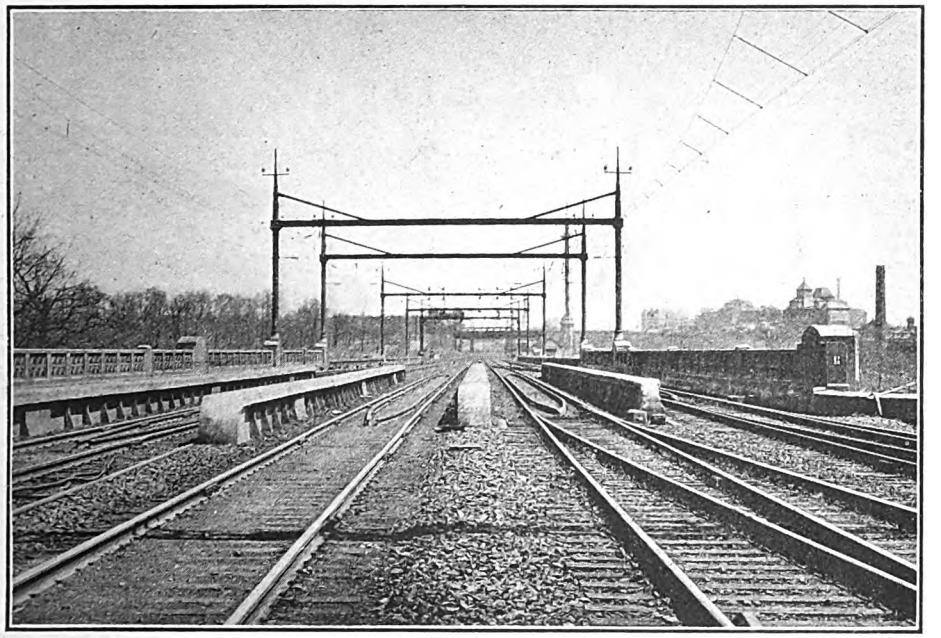
alternating-current voltage, or through rotary converters to the usual direct-current supply voltage.

In Great Britain the first difficulty will be in connection with the "right-of-way." In America, where transmission lines are erected alongside the permanent way, the difficulty of right-of-way has been overcome by agreement between the railways and the power companies. In this country the transmission lines cannot very well be erected near the permanent way, owing to the numerous bridges which cross the railway lines. Of course,

(3) The type of insulator used.
(4) The physical characteristics of the country.
(5) The climate.

Flexible-type towers have been used with a certain amount of success in America, but it is necessary to place rigid towers at certain points along the line to act as stays. The use of the flexible towers is governed by the type of insulators used, and it is very doubtful if they would be quite as satisfactory for supporting transmission lines insulated by long-suspension insulator strings.



TUBULAR POLE CATENARY BRIDGES.

insulated cables could be "dipped" under the bridges from a tower erected on each side of the bridge, a similar method to that adopted at Gretna, but this would not only be expensive, but very inefficient. Looking deeply into the matter, one is inclined to favour the erection of "towers across country," "as the crow flies," from power-house to substation.

Selection of the type of tower to be erected will depend upon the following items :—

(1) The number of circuits to be carried.
(2) The line voltage.

It would really be a step in the direction of efficiency if experiments were carried out with the object of standardising the type of tower and insulators to be used. When designing a tower, it is suggested that the following items should be borne in mind :—

Foundations.—It is desirable that, if rigid towers are used, the foundations on which the towers stand are as nearly as possible of the same height.

Material.—In the construction of towers the minimum thickness of material should be $\frac{1}{4}$ in.

Bolted connections.—When connecting

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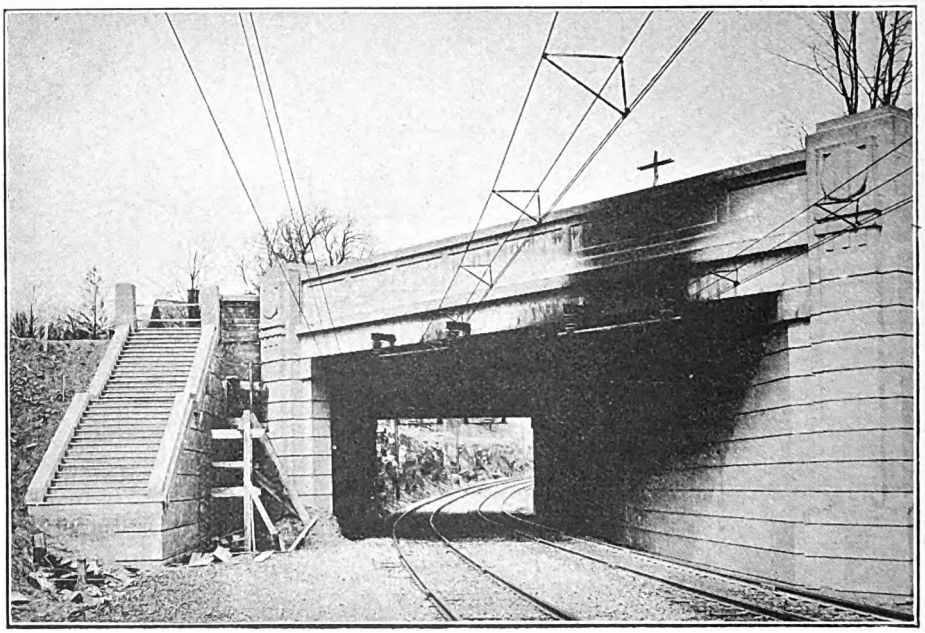
one piece of material to another, the minimum number of bolts used should not be less than two.

Strength of members.—It must be remembered, when designing towers, that men are likely to climb up and down the towers on the angle pieces. One of the limiting conditions is to see that no members are used which would be bent or strained by the weight of a man when so climbing.

Movement of wires.—The effect of ice and sleet should receive careful consideration, from the point of view of non-uniform loading. The customary angle in America for the deflection of the insulators is 45°. In this country it could be very well increased to 60°. Each span should be placed so that there can be no possible contact due to wind conditions. Referring to sleet, not less than ½ in. should be allowed for.

Tower erection.—The usual method of erecting towers is to assemble them lying on the ground, and then tilt them into position. This method is very apt to induce faults in them. It is therefore necessary to carefully inspect them after erection, with a view to tightening up the bolts and examining the members to see if they are distorted.

Galvanising versus painting.—Galvanising is to be preferred to painting at any time for tower construction. Galvanising keeps the surface of the steel from coming into contact with water and the atmosphere, and it protects the iron whenever water and oxygen succeed in breaking through. If galvanising is properly done, it may be relied upon to be in good condition at the expiration of 20 years. Painting cannot be relied upon for more than two or three years at the most. Moreover, the difficulties of painting are numerous, although it is claimed that if the connected or bearing portions are well painted before assembly, it will only be necessary to paint the members subsequently. The chief difficulty is to reach all the small interstices and pockets—the very places where rust is apt to occur. Superficial inspection frequently will not disclose rusting which may be occurring beneath the paint coating. Again, heat will blister paint, and the blister subsequently becomes a receptacle for water, and so rusting commences.



OVER-BRIDGE SUPPORT FOR CATENARY WIRES.

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Conductors.—The relative merits of copper and aluminium conductors have been discussed so often that it is hardly necessary to go into details concerning these. A thorough understanding of the different qualities of the two metals should be had by engineers designing transmission lines, especially where suspension type insulators are used. There are certain conditions where it would be folly to use other than copper conductors. On the other hand, there may be many cases where aluminium can be used to better advantage than copper.

Some years ago hemp centres were used in hard-drawn copper conductors. This should be avoided in future designs, because it was found that the hemp, after smoke and carbon had penetrated to it, set up chemical action, which considerably weakened the wires.

Referring to the adoption of aluminium and copper, it should be remembered that the tensile strength of aluminium is much below that of copper. It would, therefore, be necessary to increase considerably the area of aluminium to obtain the same mechanical strength as copper. This is not desirable, since the surface offered to the collection of sleet is greater and the resistance to wind is much higher. The problem is a difficult one.

Insulators.—This is a subject which should receive careful consideration. From figures in my possession, it would appear that suspension insulators, in the disc type with metal caps and pins, are quite satisfactory when new up to voltages of at least 150,000 volts. It would appear, however, that after they have been a year or two in service failures begin to occur. As time goes on, a large number of the sections have to be replaced, and apparently good insulators are discarded with those which are known to be bad. Regarding the composition of the porcelain for insulators for high-tension transmission, this is a problem for the manufacturers, and they will do well to tackle it immediately, taking advantage of the results of experience gained through the manufacture of insulators for the live rail in present direct-current systems. This experience will be useful when considering the insulator from a mechanical strength point of view.

The principal requirements of a good porcelain for high-tension insulators are di-electric strength and mechanical toughness. These two qualities are somewhat opposed to each other in the actual manufacture, for, when a high di-electric strength is obtained, the porcelain will be brittle like glass. It is possible, however, to arrive at mixtures which exhibit both these qualities to a marked extent if the method of fixing is properly considered. It is really regrettable that some so-called high-tension porcelain is lacking in both these qualities. In addition to poor material, the present method of design has a great deal to do with the failure of insulators. In other words, the electrical characteristics of the insulator, such as puncturing and flash-over values, both of which are highly important, should be considered in addition to the size and shape.

With certain pin-type insulators, especially those mounted on metal pins, it will be noticed that, after a few months' use, cracks will develop in quite a number of petticoats. These cracks are probably due to atmospheric changes. This can be readily understood when it is remembered that in the construction of the insulator there are porcelain, iron and cement assembled together, and the coefficients of temperature expansion of the three are quite dissimilar. When one considers the great variation of temperature between the hottest day in summer and the coldest day in winter, it can be appreciated that great internal strains are set up inside the caps. The porcelain, being the least able to withstand these forces, is the part which suffers and cracks, with the attendant electrical punctures ensuing.

There is not what we would term an efficient insulator in use in any part of the world. It is therefore up to us to lead the way, not only in this but in other directions, in the electric traction schemes which are to come.

(*To be continued.*)

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A New Petrol Shunting Engine.

FOR THE RAILWAY MAGAZINE an inspection was made recently of a new petrol locomotive designed and built for shunting work in railway and other yards, and for industrial purposes generally, by the Motor Rail and Tram Car Company, Limited, Bedford, and on opposite page is reproduced a photograph of the engine in the traffic yard of J. and F. Howard, Limited, alongside the Hitchin branch of the Midland Railway, so that the engine can be utilised on rails of light sections such as are often found in industrial and other yards.

The engine is a 40 b.h.p. internal combustion motor, having four water-jacketed cylinders, made of best close-grained cast-iron and working on the four-stroke principle. All bearings are of liberal dimensions and automatically lubricated from a geared oil pump which distributes oil through filters from the crank case

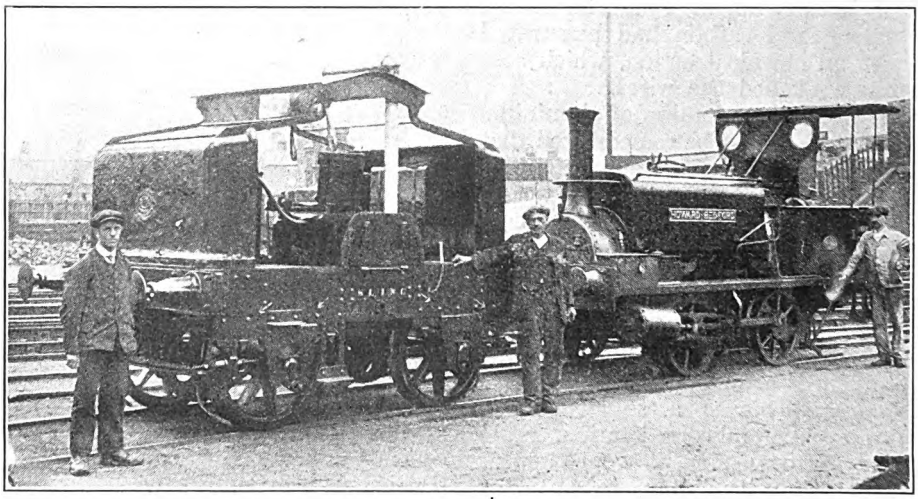

Photo.] SHUNTING ENGINES AT BEDFORD. [*Chas. S. Lake.*

The old style and the new.

Bedford, while on this page is given a picture of the same locomotive with a smaller steam shunting engine belonging to Messrs. Howards, Bedford, agricultural engineers. The petrol engine is, at the time of writing, engaged in shunting work in Howard's sidings, Bedford, and the photograph showing the two locomotives may be taken as exemplifying the old and new types of shunting engines.

Built for the standard gauge, and on a short wheel-base, the petrol locomotive is capable of accommodating itself to the curves of small radius, whilst, as the general dimensions hereafter quoted demonstrate, its total weight is a low one

sump. An oil level indicator is provided. Ignition is by means of a high tension magneto provided with an advance and retard lever by means of which the point of ignition can be set to cause the explosion to occur at the most favourable position of the crank pin and piston in given circumstances. The valves are of the usual poppet type provided with adjustable tappets, all valves, inlet and exhaust springs, &c., being exchangeable.

The transmission comprises heavy roller chains driving each axle in combination with a "Dixon-Abbott" patent gearbox, providing two speeds in both directions, the whole gear-box being completely

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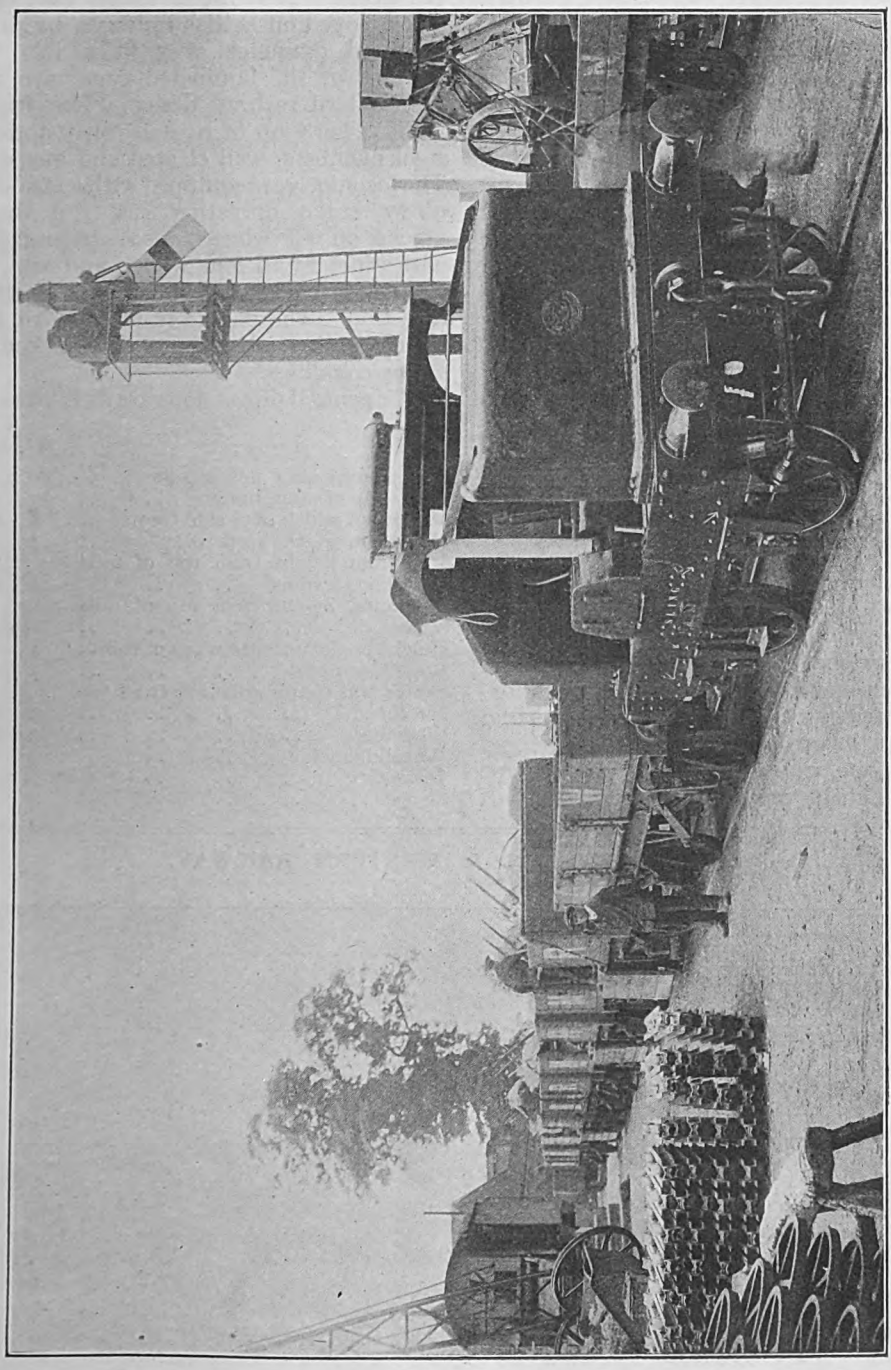

NEW PETROL SHUNTING LOCOMOTIVE IN THE RAILWAY SIDINGS AT BEDFORD.

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enclosed and running in oil. The shafts are mounted on properly housed ball-bearings, and the gears made of high-grade steel carefully hardened and ground where necessary. A clutch is provided, this being of the inverted cone type, and placed in a large diameter flywheel to overcome starting inertia. The clutch is furnished with the necessary means of adjustment, and also with backtop springs to facilitate gear changing. The control levers are arranged conveniently for use by the driver in a sitting position and for movements in either direction. The engine is cooled by means of a radiator situated longitudinally on the locomotive, through which the water from the water jacket of the cylinders is forced by a direct coupled centrifugal pump and cooled by means of a fan, the cooling effect being equally efficient whichever way the locomotive is travelling. The engine is enclosed in a sheet metal casing arranged for quick removal and giving immediate accessibility. A petrol tank of 20 gallons capacity with gravity feed is provided.

The axleboxes are of malleable cast-iron with gun-metal bearings for oil lubrication. The bearings are removable by means of a check plate without removing the axlebox, lubrication being effected by a wick type feeder lightly pressed against lower half of the journal by springs. End dust shields are fitted. The wheels are of cast steel as employed on British railways, having a standard diameter of 3 ft. 1 in. The springs, of the laminated type, are also of standard railway design. The framework is built up of riveted constructional steel members, well cleated and gusseted. The locomotive is equipped with a standard screw brake operating cast-iron brake blocks on all wheels, also sanding gear with pipes to all four wheels and adapted for delivering sand when running in either direction. The engine is fitted with four spring plunger buffers and two central spring couplings.

The general dimensions are as follows :—

	ft.	in.
Length over main headstocks ..	10	4
Length over main buffers	13	4
Maximum width over side frames ..	6	9½
Maximum width, headstocks ..	7	6
Maximum height from top of rails without awning	6	9
Maximum height from top of rails over all	—	
Height of platform from top of rail ..	4	0
Rail clearance	5	0
Buffer and coupling height from top rails	3	4½
Wheelbase	5	6
Wheel diameter	3	1
Journals .. .. .. 6 in.	× 2¾	in.
Gauge	4	8½

GREAT SOUTHERN & WESTERN RAILWAY.

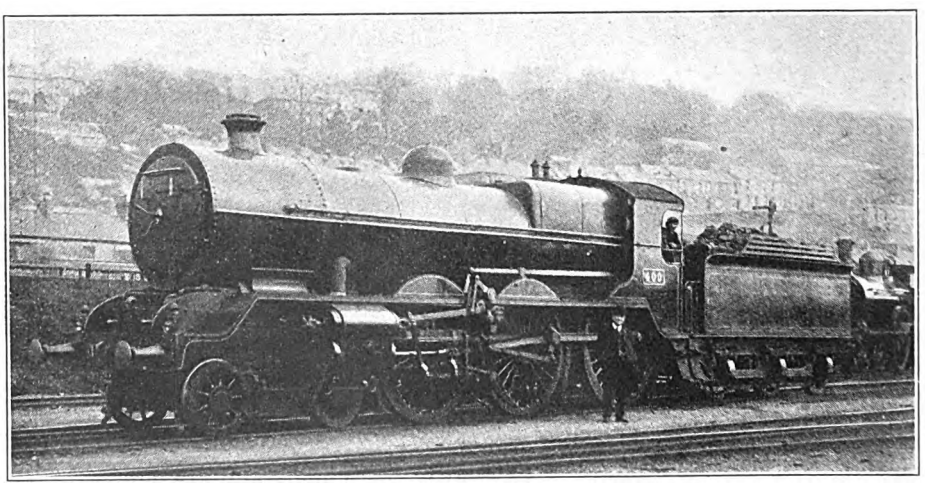

Photo.] 4-6-0 LOCOMOTIVE No. 400 AT CORK. [*H. Cronin.*

Mr. J. Johnson, District Locomotive Superintendent, is standing in the six-foot way in front of the Engine.

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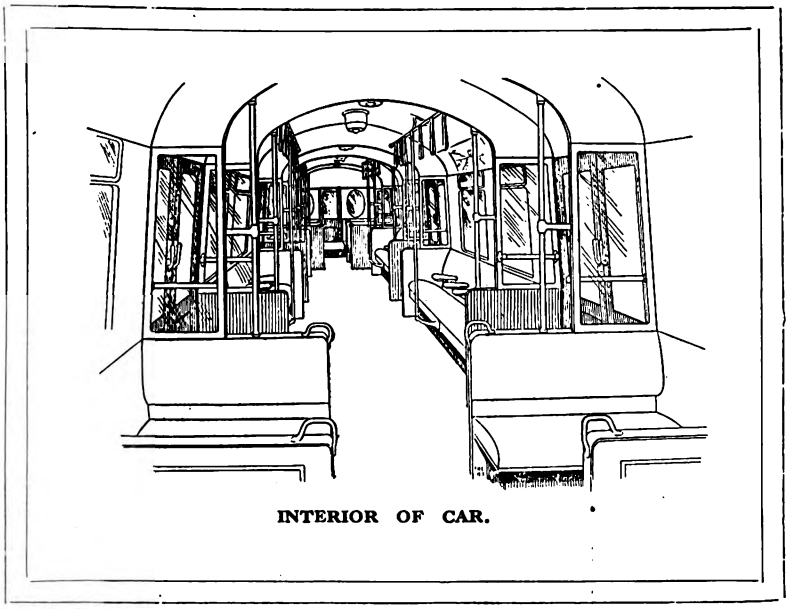
New Rolling-Stock for the Metropolitan District Railway.

Wider Cars and Double Sliding Doors for Trailers; End Vestibule Cars Dispensed with, and Improved Braking Equipment Provided.

VERY earnest attention is being given by the Underground Railway authorities to the question of additional and improved rolling-stock for their railways, and they have now under construction a new type of car which will go a long way to remedying the prevailing complaints as regards overcrowding and lack of comfort. The present needs of the District Railway alone are for 100 cars which will be put into service directly they are delivered. Already the number of vehicles worked over the tunnel section of the railway exceeds that of any other line in Great Britain, and, as it is not practicable to increase the number of trains, except to a small degree, the alternative adopted is to increase the length of each train to 400 ft. This is the maximum length permitted by the station platforms.

The new District trains will be composed of eight cars in all. The cars will be wider—the width being extended to about the limit of the present step-board—and the trailer cars will be fitted with three double sliding doors, each wide enough for two passengers to enter or leave the car at one time. On the motor-cars and control trailer cars, in addition to the three double doors, single doors are fitted at the ends of the cars which will be available for the use of passengers, when not occupied by the train staff. It is worthy of note in this connection that the arrangement made on an eight-car train gives the equivalent of 52 single doors for the use of passengers entering or leaving the train. The provision of these facilities should materially reduce the time taken in loading and unloading at stations and enable a greater number of trains to pass over the congested sections of the line during rush hours. The present type of end vestibule will be dispensed with in the new design, and the car doors so arranged that they are



INTERIOR OF CAR.

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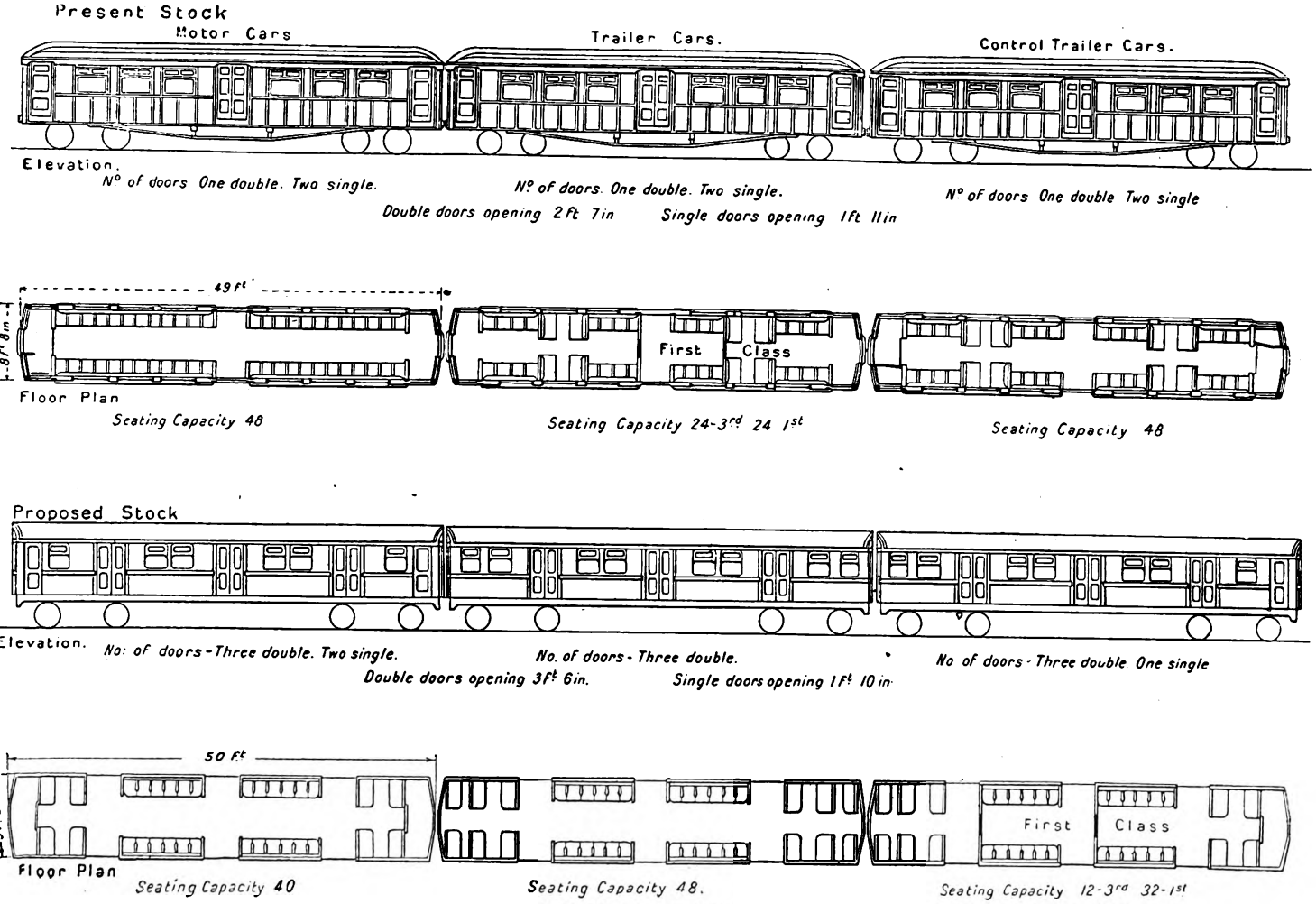

DIAGRAM OF PRESENT AND PROPOSED ROLLING-STOCK FOR THE METROPOLITAN DISTRICT RAILWAY.

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equally spaced along the side of the coach. This will mean that, no matter in what part of a car a passenger is seated, he will have a door conveniently accessible.

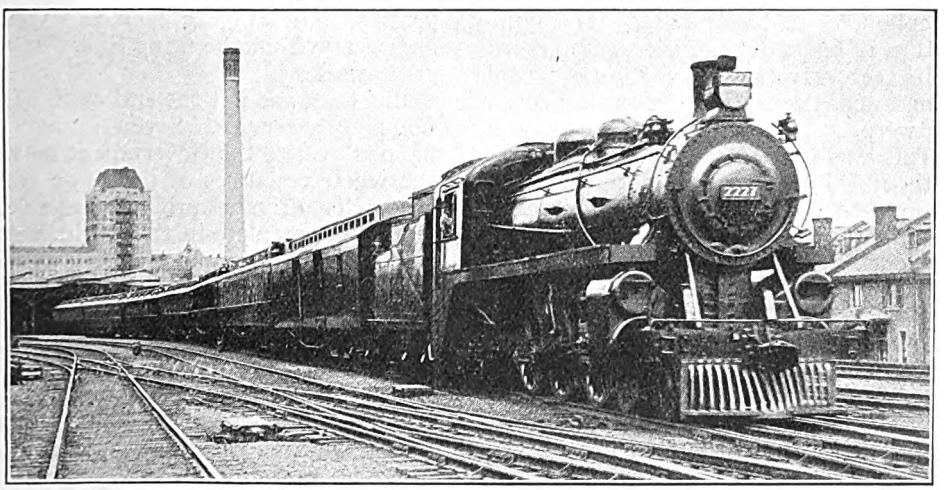
In appearance, the new stock will not differ very materially from the latest pattern District trains now running, except that the sides of the coaches will be slightly curved instead of straight. Improved springing will be fixed, and the cars will be fitted with larger bogies and wheels, and be higher-powered, which will materially improve the running as regards speed and comfort.

The dimensions will be 9 ft. 6 in. wide, compared with 8 ft. 6 in.—the present car. The length 50 ft. against 49 ft. and the new trains will be capable of speeds up to 45 m.p.h. when working "non-stop" services. The improved acceleration has been brought about by adding additional motors to the trains, and its effect will be to permit of an increased number of trains being passed through the tunnels. Improved braking equipment has been adopted, in order to secure more rapid, yet easy stopping, as the problem of getting more trains through the tunnel sections depends not only upon the time taken between stations, or absorbed by station stops, but upon the period taken in starting and stopping.

The new eight-car set is made up of two self-contained components, with a view to operating a five-car train during the slack hours and an eight-car train during the rush hours. The three-car portion can be utilised during slack hours on certain of the local sections of the line.

As regards the interior arrangements and decorations, special attention has been paid to the design of the seats, and greater gangway room has been afforded in order that the maximum amount of comfort will be obtained by travellers. The upholstery will be in moquette velvet in non-smoking compartments, and in "smokers," of a washable leather, or some such material as "Pegamoid." At each end of the car there will be large oval plate-glass windows, which will give a very artistic appearance and finish to the car. The interior metal fittings and door handles will be of a non-oxidising material. Improved ventilation is being fitted which is designed to suit the difficult conditions of a train running both in tunnels and in the open. Convenient hand-rails and vertical pillars will be provided at points next doorways and at open spaces.

The stock is constructed of steel throughout, except for a small amount of woodwork which is chemically treated, in order to make it fireproof.



CANADIAN PACIFIC RAILWAY.

The Trans-Canada, Limited. *See page* 137.

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The T.O.T. Great War Record.

MEN WHO FOUGHT ON EVERY BATTLEFIELD.

QUITE recently, the London Underground Railways group of Companies had a "Flag Day" to welcome home the 9,000 men who have returned to their employment after war service. There was a great rally at the Albert Hall, and General Sir Julian Byng—whose "Byng Boys" did such valiant work—presented the men who had received war decorations with a parchment as a souvenir of the Companies' high esteem of their patriotism.

The military work of these Companies is one of the romances of the war. When giving evidence before the Select Committee on London Transport, Mr. Herbert E. Blain, the operating manager, declared that theirs were probably the first companies to be seriously affected by the war, and he told a dramatic story that fully justifies the claim. Within 48 hours of the outbreak of hostilities, upwards of 3,500 of their employees were called to the colours, 'buses were commandeered in the streets and diverted to the transport of troops, and garages were quickly placed at the disposal of the War Office.

Then came the Antwerp Expedition, and one night in September, 1914, Mr. Winston Churchill, the First Lord of the Admiralty, telephoned a demand for the supply within 14 hours of 75 'buses equipped with volunteer drivers and kits, maintenance gangs and stores, for instant service at Antwerp.

This was carried out to the last detail without a hitch. Many of the men who volunteered did not leave their work till midnight, yet they sprang into the breach without a murmur, and the men and 'buses were mustered on the Embankment at 8 o'clock the following morning.

In October, 1914, a similar call was made, but this time for 300 'buses and 330 drivers for the Battle of the Aisne, and, as in the case of Antwerp, the Company again rose to the occasion.

From time to time, when additional necessities arose, special efforts were made to free more men for service, until no fewer than 3,481 engaged with the Underground Railways, 9,648 with the 'buses, and 2,850 with the associated tramways and manufacturing companies—a total of 15,979—had enlisted, the total number of 'buses also freed for war purposes being 1,319. Glowing testimony has been given to the services rendered by these vehicles and by the London 'busmen who piloted them through the dangers of the war zone with the same *sang froid* as they showed in Piccadilly.

Stories are told of how these men not only drove their 'buses amid shot and shell, but had also to fight in many a tight corner to defend the ammunition convoys. Some of them can tell of miraculous escapes when their 'buses have been blown to pieces by German shells, and one proud 'busman had the luck to capture a dozen Germans and drive them into camp on the top of his 'bus to the delight and amazement of his fellows.

Of the 16,000 men enlisted in the Army and Navy, 1,170 lost their lives in the war. They fought on every battlefield and in almost every branch of the services. The 'buses were a godsend wherever they went—carrying food, ammunition, reinforcements of men rushed up in emergencies, and bringing back the wounded and weary from the firing line. It was a great work.

But that was not the end of the L.G.O. Company's service. Seven garages were handed over to the Government as well as the whole resources of the huge training school for drivers, probably the largest and most complete in the world. At the beginning of the war the Army had no organisation of this kind, and the company therefore took over the training of motormen, turning out no fewer than 21,222 efficient drivers for the Army Service Corps. In addition, the company did all the London transport in connection with the Belgian refugees, a work continued right up to May of the present year. 'Busmen also provided a detachment of 485 special constables and two ambulances,

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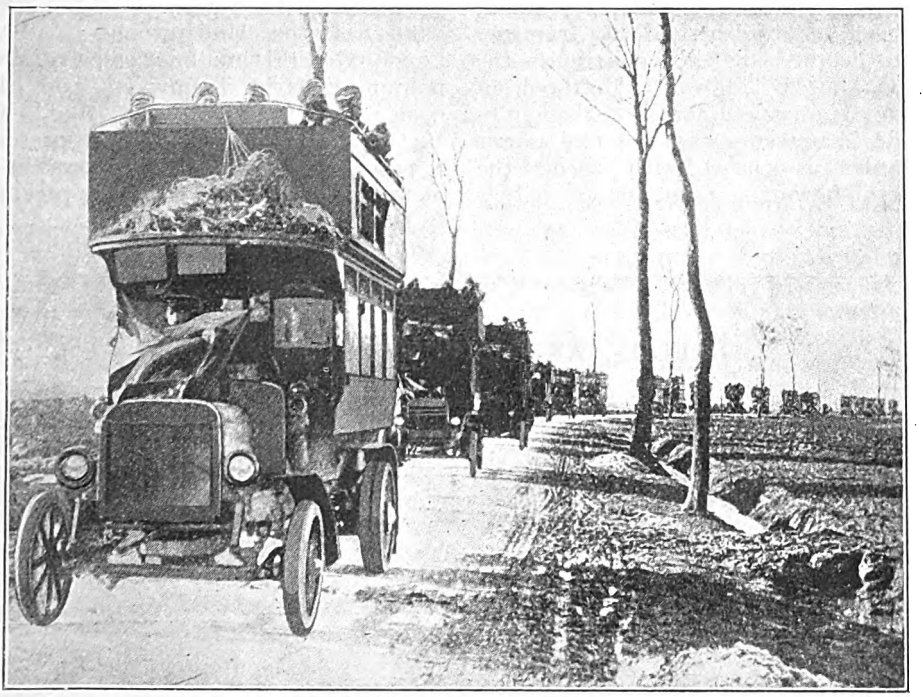
and during the air-raid periods these were always available for night duty.

The work of the Underground Railways during the air raids was, in fact, one of the greatest public services rendered to London. Mr. Kennedy Jones, the Chairman of the Select Committee, specially complimented the railways on their splendid work in this direction. The peculiar invulnerability of the Underground railways to air raids was, as Mr. Blain said, very early realised, and accordingly all their stations—and, to a large extent, raids, but watchmen were kept on all night to open stations in emergency, and blankets and accommodation were provided for those requiring first-aid treatment. This had a very marked effect in maintaining public confidence during a very trying period.

Another aspect of the Underground Company's war work has been the "Safety First" Campaign, which has been instrumental in enormously reducing the number of accidents. Considerable success has attended the experiments with regulating



LONDON MOTOR 'BUSES ON WAR SERVICE IN FRANCE.

their trains also—were put at the free disposal of the public, to the entire dislocation of ordinary traffic. Over 4,000,000 people were estimated to have taken advantage of this underground shelter, and as many as 300,000 sought cover on one night (February 18, 1918). So admirable was the work of the staff in regulating the crowds and allaying the tendency to panic that, in spite of the enormous numbers dealt with, there was only one mishap.

Not only did the public get free shelter and free travel on the occasion of these barriers, gates, and queues on railway platforms, and with the establishment of queues at some 70 stopping-places on the 'bus routes. Bonus schemes have been put into operation, whereby 'busmen receive rewards for periods of freedom from accidents, and instruction is given at the training school on how mishaps occur and how they may be avoided.

As a result of this campaign, the Underground Company has effected a decrease every year in the number of accidents, the percentage decrease on the previous year being 25·80 per cent. in 1915, 21·28

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per cent. in 1916, 31·61 per cent. in 1917, and 13·57 per cent in 1918. The percentage decrease in 1918, in comparison with 1914, is no less than 64·48, the accidents having been reduced by considerably more than a half, so far as the companies' operations are concerned.

On the railway side the number of accidents is, of course, relatively small, owing to the trains running on lines upon which there is no traffic of a different type, but the campaign is also prosecuted there, and during the war period the accidents have been reduced by 15·8 per cent.

There has also been a great improvement in respect of accidents on the tramway systems worked by the companies—the London United Tramways, Metropolitan Electric Tramways, South Metropolitan Electric Tramways—and the two power Companies associated with them, the numbers showing a reduction of 28 per cent.

Taking the police statistics of all street accidents for the whole Metropolitan district, the figures show a huge decrease—from 56,367 in 1914 to 29,399 in 1918,—in spite of the darkened streets.

Functions arranged by the powers that be at Electric Railway House, Westminster, are always excellent, but the T.O.T. programme of Victory and Welcome Home Celebration at the Albert Hall—alluded to in the first paragraph of this article—surpassed in magnificence any previous effort of these accomplished organisers. The chair was taken by the Right Hon. Lord George Hamilton, G.C.S.I. Massed bands of the Underground Railways, London General Omnibus Company, Metropolitan Electric Tramways, and allied companies, together with the T.O.T. Victory Day Choir of 400 voices, presented a programme that will live long in the memories of all those who were privileged to be present.

BRECON AND MERTHYR RAILWAY.

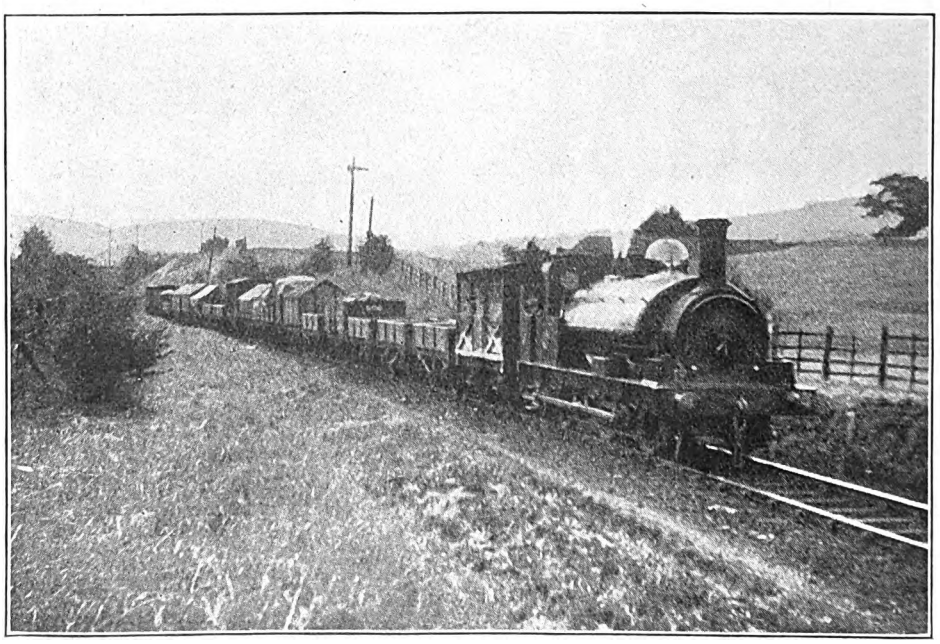

Photo.] [*K. A. C. R. Nunn.*

GOODS TRAIN APPROACHING LLYNALLWYN BOX.
0-6-0 Saddle Tank Engine No. 4.

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The WHY and the WHEREFORE

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which was published in April, 1919, price 5s. net, by post 5s. 6d. This edition is nearly out of print but a new one is in preparation, in readiness for publication in April, 1920.*

Staggered Joints.

It is a common practice in the United States to "stagger" the joints in the rails, *i.e.*, instead of "squaring" the joints on the two rails of a single track, to arrange the joints on one side opposite the centre of the rails on the other; but no company in the British Isles, other than the Great Southern and Western Railway of Ireland has yet standardised this method of track-laying. Several have made experiments—the Great Eastern Railway has some considerable lengths of staggered-jointed track laid in the Eastern (Ipswich) Division, and contemplates, we believe, a further extension of the system. It is essential with staggered joints that the joints shall always be kept well beaten up; otherwise they tend to impart a "lurching" motion to the vehicles, especially at high speeds. This is the principal objection urged by the permanent way engineers who are opposed to the practice. If well laid and maintained, however, staggered joints should both improve the running and prove a source of added strength to the track.

[Reply to D. B. B.]

"Last Vehicle" Indications.

It is necessary to have some sign on the back of the last vehicle of every train, in order that signalmen and others concerned with the working of the traffic may see clearly that no vehicles have broken away from a train during its journey. The customary indication is a tail-lamp, painted red for easier visibility and unlighted by day. Variations from, or, rather, additions to this standard are made in the case of slip coaches or of trains which are being followed by special trains, but with such special cases your query is not concerned. The tail-board lettered "last," to which you refer, is the Highland Railway method of indicating the last vehicle by day, in place of the unlighted lamp. A similar idea is also employed by the London, Brighton and South Coast Railway, the tail-board in this case being lettered "L.V.," for "Last Vehicle."

[Reply to JAS. DICKSON.]

Tunnels on the G.N.R. main line.

Following are the tunnels on the main line between London and Shaftholme Junction, north of Doncaster: Maiden Lane and Copenhagen (between King's Cross and Holloway), 3 parallel double line tunnels in each case; Wood Green (between Wood Green and New Southgate) and Oakleigh Park (between New Southgate and Oakleigh Park), in each case double line tunnels for the main line, flanked on either side by single line tunnels for the up and down slow lines; also double line tunnels as follows:—Hadley Wood (between New Barnet and Hadley Wood); Potter's Bar South and

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Potter's Bar North (between Hadley Wood and Potter's Bar); Welwyn South and Welwyn North (between Welwyn and Knebworth); Stoke (between Corby and Great Ponton); and Askham (between Tuxford and Retford. Last-named is very short.

[Reply to R. D. WILKINSON.]

Tea-Cars.

As in the majority of instances the so-called "tea-cars" are simply ordinary passenger coaches, from which one or two compartments have been removed to form a small kitchen and pantry, it is frequently the practice to keep the kitchens locked up on journeys on which the patronage would be negligible. In this way the staff are able to return to the starting point as passengers by the earliest available train, and their working hours can be kept at a reasonable figure. This may account for your being unable to trace the return working of certain Great Western Railway tea-cars.

[Reply to T. C. ADKINS.]

London and North Western Lines between Stalybridge and Marsden.

By running lines on both sides of the valley from Marsden down to Stalybridge, opportunity has been taken of continuing to Stalybridge the four tracks existing from Huddersfield to Marsden, and at the same time of tapping two somewhat different areas. The same might be said, in a still greater degree, of the two London & North Western routes between Heaton Lodge Junction, Huddersfield, and Leeds.

[Reply to C. STONETAIL.]

G.N.R. Hertford Loop.

This line is only at present used by goods trains, and is not likely to be opened for passenger traffic until a double road has been laid down; no information is at present available as to the date of such opening. The Hatfield-Hertford service will doubtless be continued, as it serves a fairly populous district and affords direct connection between the important towns of St. Albans and Hertford. Your other query in this connection is purely speculative, and impossible of answer.

[Reply to CAPTAIN G. CULLIS.]

The Most Cosmopolitan Station.

Including the owning companies, seven lines have running powers into Carlisle—the London and North Western, Caledonian, Midland, Glasgow and South Western, North British, North Eastern, and Maryport and Carlisle Railways; and, in addition, the engines and trains of the Furness and Lancashire and Yorkshire Railways are not infrequent visitors. There is no other British junction which can show so extensive a list as this.

[Reply to L. S. W. R.]

Locomotive Performance.

Your remarks as to the capabilities of a certain 4-6-0 locomotive type are obviuosly based on appearance—a fatal error—rather than experience. It does not "stand to reason" by any means that they could "do considerably better" than the 4-4-0 class you name; on the other hand it stands on record that they *have done considerably worse* on passenger trains, rather than better. *Experientia docet.*

[Reply to "BANBURY CAKE."]

Locomotive Shed Notes.

We no longer provide information concerning the sheds at which particular engines are located. (See rules at the head of these columns.) By the time such answers appear in print the locomotives are often removed to other sheds. In the latter case large numbers of readers write to state we are wrong, quite overlooking the fact that the information was correct when we went to press.

[Reply to "SAINT NICHOLAS."]

Pullman Cars.

Pullman cars, which are vehicles owned and operated by the Pullman Car Company run in this country on the South Eastern and Chatham, London, Brighton and South Coast, Caledonian, and Metropolitan Railways only. The Lancashire and Yorkshire Railway, to which you refer, does not run any Pullman cars in its trains, although it possesses large numbers of open cars with central corridors and end vestibules.

[Reply to T. O.]

A Phraseological Poster.

We are unable to throw any light upon the poster to which you refer, advertising the "Cornwall Riviera in Six Hours," as in pre-war days the "Cornish Riviera Express," the best train on the Great Western Railway Cornish service, took

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6¼ hours to Falmouth and 6½ hours to Penzance from London. Only two queries from one correspondent are answered in any one issue.

[Reply to G. RODBARD.]

Cab Signalling, Great Western Railway.

The ramps or contacts in the centre of the "four-foot" on the Great Western Railway main line actuate bells in the drivers' cabs and also give visible warning when a signal is at danger, in the case of engines suitable fitted. These contacts are situated at fixed distances from the signals to which they refer, rather than at any particular distance from each other.

[Reply to "GREAT BEAR."]

Grass on Embankments.

Where a good crop of hay can be obtained on embankments or in cuttings it is frequently the practice of railway companies to cut it and sell it if there are facilities readily available for collecting it. Otherwise the usual practice is to burn it systematically in order to prevent it from taking fire by engine sparks, with the risk of the fire spreading to adjacent property.

[Reply to "GREAT BEAR."]

Drummond 0-4-4 Tank Engines, London and South Western Railway.

Latest of these engines are equipped with feed-water heating apparatus (of which the pipe running from the smoke-box into the side tank, to which you refer, forms a part), and the apparatus seen by you between the rear coupled wheels and the bogie is a duplex feed pump, as ordinary injectors will not lift hot water into the boiler.

[Reply to F. HORDER.]

Reduced Speed Indications.

A standard form of indication is now used by most British railway companies at locations where the speed of trains must be reduced in consequence of permanent way operations. It consists of a round sign, raised about 4 ft. from the ground, and illuminated at night, showing a black letter "C" on a white background for "commencement" of slack, and "T" for "termination."

[Reply to R. E. ABBOTT.]

The Heaviest Express Engine.

As far as published figures go, No. 335, the London & South Western Railway 4–6–0 as rebuilt by Mr. Urie, ranks after *The Great Bear* as the heaviest express engine in this country, having a total weight in working order of 79 tons 12 cwt. The whole of the original four cylinders and motion were removed on rebuilding, and the engine is now two-cylinder only.

[Reply to F. HORDER.]

Trucks on Passenger Trains.

Trucks fitted with the continuous brake are frequently run in passenger trains for the conveyance of fish or of road vehicles, theatrical scenery, &c., and occasionally are run in express trains for these purposes. Goods trucks pure and simple are only run in conjunction with passenger vehicles in "mixed" trains on branch lines where the traffic is small.

[Reply to GERALD SHANNON.]

A Mysterious Query.

"How many has the Midland and Great Northern Joint Committee got?" is a question covering so wide a field of research that we are unable to answer it, unless you specify whether you refer to engines, signalmen or typewriters. You will find all the leading statistical particulars concerning this and other railways in the "Railway Year Book."

[Reply to S. MURRAY and R. COMPTON.]

Pontypridd Accident, Taff Vale Railway, 1911.

Only one engine was involved in this accident, as it was caused by a passenger train running into the rear of a mineral train at Coke Ovens; the engine of the former was a 0–6–2 type tank, but we are unable to trace the number. The train was the 9.10 a.m. from Treherbert to Cardiff.

[Reply to "FRONT END."]

Snifting Valves.

The "raised box-looking apparatus on top of the boiler behind the funnel" of No. 328, 4-6-4 express tank, London, Brighton and South Coast Railway, is the casing of the snifting valves, whose function has been explained several times in these columns. Your second query traverses the rules.

[Reply to "BALTIC."]

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A Great Eastern Railway Query.

Next station north of Tottenham (Hale), on the Great Eastern Railway Cambridge main line, and 7 miles from Liverpool Street, is known as "Park." Presumably this arises from the proximity of the road known as "Northumberland Park," as there is no public or other park in the vicinity.

[Reply to E. H. G. SARGENT.]

Main Single Line in Cornwall, Great Western Railway.

Following are the sections of the Great Western Railway main line below Plymouth that are still single track:—Royal Albert Bridge to Saltash (½ mile), Scorrier to Drump Lane (1¾ miles), St. Erth to Marazion (3¾ miles), and Ponsaudane Siding to Penzance (¾ mile).

[Reply to G. RODBARD.]

London and North Western Scottish Night Expresses.

9.25 p.m. express, Euston to Glasgow, stops at Crewe for locomotive purposes, this being the only halt between Euston and Carlisle. The 8.30 p.m. down "Postal" is scheduled to call at Rugby, Tamworth, Crewe, Preston, and Carnforth to Carlisle.

[Reply to S. C. SEARLS.]

4-6-0 Engines, Glasgow and South Western Railway.

We do not undertake to answer questions regarding dimensions, but, in regard to your second query, we may mention that the 4-6-0 engines of the Glasgow and South Western Railway take their turns in working express trains between Glasgow and Ayr and beyond.

[Reply to H. F.]

The Busiest Junction in the United Kingdom.

"Busiest" is a vague term, but if by this you mean the junction through which the largest number of trains pass daily, the distinction is usually claimed for Clapham Junction, London and South Western and London, Brighton and South Coast Railways.

[Reply to L. S. W. R.]

Great Western Railway Locomotives.

No compounds exist on the Great Western Railway other than the three French 4-4-2 engines, Nos. 102, 103 and 104. The "Kings" are 4-cylinder simple 4-6-0 engines, and *Robin Hood* is a 2-cylinder 4-6-0, converted some years ago from the 4-4-2 wheel arrangement.

[Reply to S. MURRAY and R. COMPTON.]

The "Fastest Railway" in England.

"Fastest" is a somewhat vague term, but in regard to the speed of its point-to-point bookings, and the maximum speed attained in running, the Great Central Railway could undoubtedly claim this distinction at the present time.

[Reply to J. M. ANDERSON.]

"999" Class, Midland Railway.

These engines, which are 4-4-0 "simple" equivalents of the compound series, were constructed to Mr. R. M. Deeley's designs in 1907. All have been rebuilt with 20½-in. by 26-in. cylinders and superheaters, and work on the Leeds-Carlisle section.

[Reply to "FRETON."]

Cosmopolitan Railway Working.

We doubt whether there is any stretch of line round London on which, in normal times, you could see a greater variety of different companies' locomotives than on the West London Railway and the West London Extension.

[Reply to E. H. G. SARGENT.]

The "Most Punctual Railway."

War conditions have been somewhat upsetting to punctuality, but prior to the war the Great Eastern Railway was generally admitted as taking the premier place in this respect.

[Reply to J. M. ANDERSON.]

London and North Western Trains from Manchester to Yorkshire.

Route used by these trains between the junctions in Victoria Station and at Stalybridge is the property of the Lancashire & Yorkshire Company.

[Reply to C. STONETAIL.]

Colour of Locomotives, Furness Railway.

There is a slight difference between the respective shades adopted for engines on the Midland and Furness Railways, the former being specified as crimson lake, and the latter as Indian red.

[Reply to "FRETON."]

Superheated 4-4-0 Engines, Lancashire and Yorkshire Railway.

All the superheater 4-4-0 engines on this railway have been rebuilt from previously existing non-superheater 4-4-0 locomotives.

[Reply to T. O.]

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Railway Literature.

GEORGE WESTINGHOUSE: HIS LIFE AND ACHIEVEMENTS. By Francis E. Leupp. [London: John Murray. Price, 15s. net.] This is the authorised biography of the famous engineer and inventor of the automatic air brake, and of the equally important automatic railway signal, and the pioneer in developing the use of electricity. As unfolded by Mr. Leupp, in over 300 pages, the career of George Westinghouse reads like a romance—his financial troubles, the events which led to his marriage, and all the various episodes of his life, are dealt with in a most attractive manner.

As explained in the preface of Mr. Leupp's book, George Westinghouse left behind him no diaries, no files of personal correspondence, and scarcely any other sources of supply on which the biographer might depend. Mr. Leupp's acquaintance was only social, and the hope is expressed that one day we may have from the pen of some well-known expert in technology an adequate summary of what the whole world's industrial advancement owes to the work of the eminent inventor. The mission of the present volume is simply human. It will have been accomplished if it conveys to the young man of to-day a sense that his career will depend for success less on the splendour of its start than on the spirit in which he pursues it; far less on capital than on courage, on worry than on watchfulness, on "pull" than on persistence.

On the foregoing grounds the book may be recommended to young men who have set out, or are about to set out, upon an engineering career. The way of the inventor is hard, but to be beaten by a difficulty George Westinghouse found to be harder still. Striking evidence of this trait in his character is given in a chapter entitled, "Nothing succeeds like success." In it the author deals with the uphill work George Westinghouse had in his endeavour to obtain a footing in Great Britain.

Mr. Leupp may be congratulated upon the production of a very readable biography.

TRANSPORT: THE MAGIC CARPET OF INDUSTRY. By J. P. Griffiths. [London: George Philip & Son, Ltd., 32, Fleet Street, E.C.4. Price, 2s. 6d.; by post, 2s. 10d.] This newly-published crown 8vo. book, of 256 pages, is a well-written description of the history and development of transport by sea, road, canal and railway. Profusely illustrated by half-tone photographic reproductions and maps, it will be found delightfully fascinating, interesting and instructive by the rising generation of students of transport questions, and particularly to those whose interest is mainly centred in the iron road.

The birth and infancy of railways is briefly described, while the early history of the locomotive is succinctly dealt with. Gauges, toy-railways, the language of railway signalling, the platelayers' work in tunnels and elsewhere, the training and duties of an engine driver, modern express trains, gathering and dropping of the mails, accidents and engine cleaning, are but a few of the subjects encountered in the exceedingly entertaining railway portion of this illuminating book.

The author takes a peep into the future, and predicts that aeroplanes will play an important part in the transport of the future.

We have refrained from making quotations from the body of the book, which we feel is one that the readers of the RAILWAY MAGAZINE—the younger ones in particular—should study for themselves; but from the author's "conclusion" the following may be cited:—

Hitherto boys have joined the railway service principally because:—

1. Their elder relatives were railway servants.
2. It was practically the only employment in the district.
3. The railway offered cheap travelling to its servants, and usually regular work.

Only in a few instances do they appear to have been attracted by the work.

Already many and definite signs are appearing that transport will be accorded a place of greater distinction in the world of industrial employments. Educational authorities are increasing the scope of railway lectures; there is an increasing demand for the literature on the subject, of which there is now a little more variety; whilst many railway companies are offering inducements to their staffs to study the work more thoroughly.

THE ECONOMIC REVIVAL OF ITALY. [Italian State Railways: London, 12, Waterloo Place, Regent Street, S.W.] RAILWAY MAGAZINE readers interested in facts and figures concerning Italy may obtain a copy (gratis) on application to the London manager of the Italian State Railways. The author points out how, in pre-war days, Germany obtained a formidable and systematic

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commercial penetration of Italian territory by taking advantage of the new trans-Alpine means of communication, through the Saint Gothard, the Simplon, and the Loetschberg, and by moderating her railway tariffs. He likewise directs attention to Italy's interest in international railway movement. In the financial working for 1913–14 the year which immediately preceded the outbreak of war, the sum of foreign imports into Italy by railway reached the total weight of 2,259,000 tons, while Italian exports by land were limited to 592,000 tons. He shrewdly remarks: "A railway tariff policy that should aim at ensuring a load for these empty returning trains, with the lowest rates for exported goods, would benefit the railway budget as well as the expansion of trade beyond our frontiers."

By means of diagrams drawn in the similitude of winged wheels, the book demonstrates the development of the Italian railway system from 8,800 km. in the year 1881 to 17.600 km. in 1913.

"THAT BEAUTIFUL ISLAND."—It has been said that Sir Walter Scott discovered Scotland, but it is not generally known that similar credit might be ascribed to the famous poet and novelist in regard to the Isle of Wight. Sir Walter visited the island in 1807, and bestowed upon it the exalted praise: "That beautiful island which he who once sees never forgets, through whatever part of the wide world his future path may lead him."

In Queen Victoria's day, "England's Garden Isle" enjoyed a marked popularity among English holiday makers and tourists, but this was succeeded by a German peaceful penetration, and English patronage waned as a consequence. The war has produced a marked change. The Teutonic tourist, with his primitive table manners and coarse conduct, comes no more, but English-speaking visitors are re-discovering the island's charms, and they are enjoying delightful holidays and rest cures within its sea-encircled shores, its cliffs, hills and valleys.

There are three separate railways in the Isle of Wight, and to provide for the growing public interest in the island as a holiday resort the three companies have jointly produced a well-written, illustrated tourists' handbook and hotel, commercial and boarding-house guide. The book has been published as an official guide to the island railways and intending visitors may obtain copies from Mr. H. K. Day, Isle of Wight Railway, Sandown; Mr. Russell Willmott, Isle of Wight Central Railway, Newport; or Mr. G. M. Button, Freshwater, Yarmouth and Newport Railway, Newport, Isle of Wight.

Valuable information is given in regard to the situation of the island, and how to get there. Thus, it is pointed out that it is 4½ miles from Portsmouth Harbour to Ryde, the sea passage taking twenty minutes; while, from Ryde Pier Head Station, the trains of the Isle of Wight Railway convey the visitor to Sandown, Shanklin, Ventnor, Bembridge, &c., and those of the Isle of Wight Central Railway to Newport, Cowes, Yarmouth and Freshwater for Totland Bay, &c. In passing, it may be remarked that the latter localities are being favoured to a very considerable degree by discriminating people.

It takes 55 min. to make the 12 mile sea-passage from Southampton to Cowes via Southampton Water and the Solent. From Cowes the trains of the Isle of Wight Central Railway convey the traveller to Newport, Sandown, Ventnor Town, St. Whitwell, Freshwater, &c. The sea-passage from Lymington to Yarmouth, 4½ miles, absorbs 25 min.

Frequent steamer services from Portsmouth and Southampton daily, connect with express trains from London and all parts of the mainland.

The book is welcome not alone for the information it gives concerning the attractions of the Isle of Wight, but also as a sign of the times. Armageddon, with all its stress and strain, is over, and although peace may have its problems no less pronounced than war, the man who needs a vacation may take one without the fear of being charged by his friends, or by his own conscience, with a lack of patriotism.

"LEGISLATIVE REGULATION OF RAILWAY FINANCE IN ENGLAND" is the title of a work by Dr. Chin-Chun Wang, of the Chinese State (Pekin-Hankow) Railways, published in a series of economic studies included in the University of Illinois series dealing with the social sciences. It is mainly concerned with the financial side of railway constitution and working in England.

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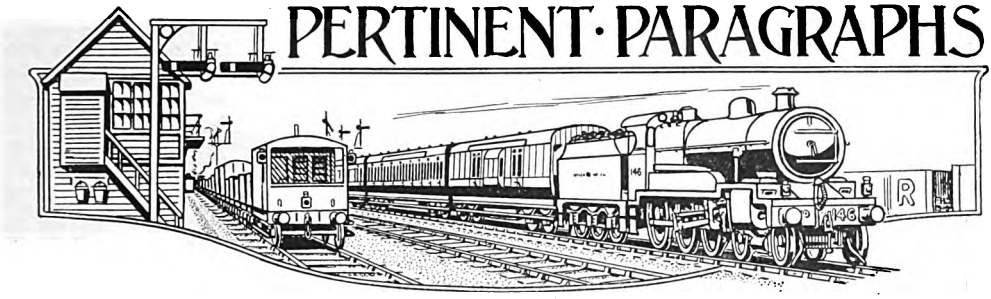
PERTINENT·PARAGRAPHS



Our Frontispiece.

WITH this issue is presented, as a frontispiece, a fine reproduction of one of the new "hourly" expresses on the London–Bournemouth service of the London and South Western Railway. This somewhat striking departure from precedent, whereby express trains now leave Waterloo for Bournemouth at even hourly intervals throughout the day, is dealt with at greater length elsewhere in these pages. The train illustrated, which is a heavy one of 14 bogie vehicles, and is seen running at about the mile-a-minute rate near Farnborough, is headed by one of Mr. R. W. Urie's large 2-cylinder 4-6-0 express engines of the new "736" series. Perhaps the most remarkable feature of these engines is the size of their cylinders—22 in. diam. by 28 in. stroke—dimensions found elsewhere in this country only in the large 4-6-4 express tank engines of the London, Brighton and South Coast Railway—and such tractive power, coupled with a boiler of ample steam-raising capacity and 6 ft. 7 in. driving wheels, should render the engines concerned capable of unusual feats in the realm of weight haulage at speed. It is interesting to note how completely the Drummond tradition—both in external and internal design—has been departed from by Mr. Urie in this design. Four cylinders have given place to two, firebox water-tubes to a steam superheater, while the raised running plate and absence of splashers, extended smokebox and outside frames to the tender bogies, which were novelties in Mr. Urie's "482" class, have been added to in the "736" series by a coned boiler and a "stove-pipe" chimney with *capuchon* of an entirely new pattern. The resultant effect is very striking.

A New Trans-continental Train.

IN order to cope with the increasingly large volume of trans-continental travel, and to give business men a faster train between East and West, the Canadian Pacific Railway has inaugurated a new daily limited express train—the Trans-Canada, Limited. It is illustrated on page 127.

This train, which came into service on June 1, reduces the journey from Montreal or Toronto to Vancouver, or in the reverse direction to less than four days, and saves a full business day. The train is strictly limited; that is, it has space for sleeping-car passengers only. In addition to the ordinary sleeping cars, compartment cars are run out of both Montreal and Toronto.

A passenger from Toronto can leave that city at 7.15 p.m., and be in Winnipeg at 9.5 a.m. on the morning of the second day. A Montreal passenger can leave at 3.30 p.m., and an Ottawa passenger at 6.45 p.m., reaching Winnipeg at the same time. Calgary is reached on the morning of the third day. The trains in the reverse direction are arranged with equal convenience to the business man, so that he can leave these cities eastbound in the evening. Thus a Toronto man with business to do in Winnipeg could leave Toronto on Monday evening, spend a full day in Winnipeg, and be back in Toronto at 2.30 p.m. on Friday.

This new train is proving particularly convenient for tourists from the eastern cities of Canada and the United States desiring to reach the popular summer resorts of the Canadian Pacific at Banff, Lake Louise, Glacier, Vancouver, and Victoria. It is likewise a great boon for travellers to the Orient, who are enabled to save a full business day in connecting with the Canadian Pacific Empress steamships from Vancouver.

The time schedules of the Trans-Canada, Limited, show a running time of 93½ hours, westbound from Montreal to Vancouver, and 92¼ hours, eastbound from Vancouver to Montreal. From Toronto to Vancouver, 89¾ hours; from Vancouver to Toronto, 88 hours.

Captain Fryatt's Homecoming.

ON Friday, July 4th, the body of Captain Charles Algernon Fryatt, Master of the Great Eastern Railway steamship *Brussels*, who was murdered by the Germans on July 27th, 1916, was exhumed from its Belgian resting-place and, after lying in state in Bruges, was conveyed by special train to Antwerp. Among those included in the

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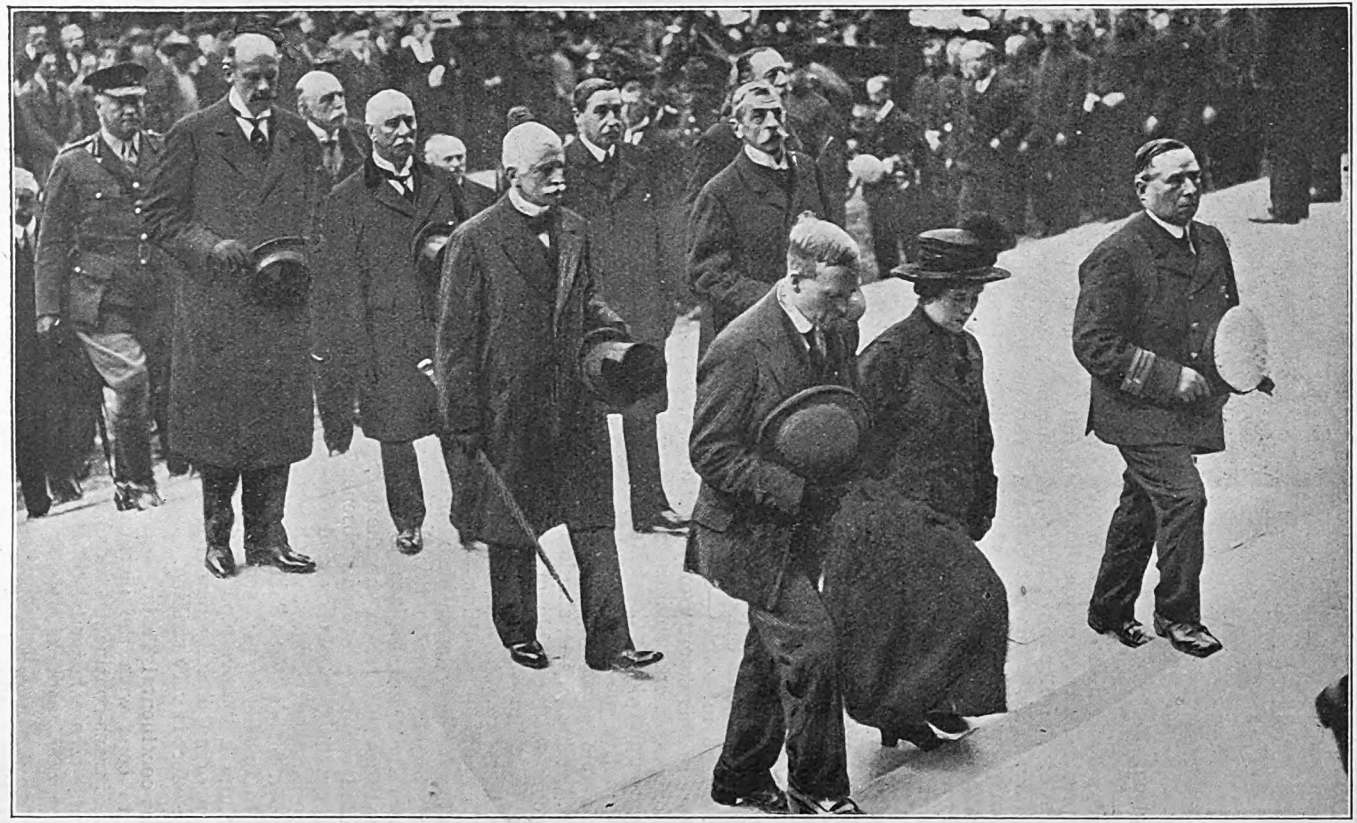

Photo.] [*Topical.*

THE RIGHT HON. LORD CLAUD HAMILTON, CHAIRMAN OF THE GREAT EASTERN RAILWAY, AND OTHER DIRECTORS, AND MAJOR-GENERAL SIR H. W. THORNTON, K.C.B., GENERAL MANAGER OF THE GREAT EASTERN RAILWAY AT THE FUNERAL SERVICE OF CAPTAIN FRYATT AT ST. PAUL'S CATHEDRAL.

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procession to the station were officers of the Great Eastern Railway, who also travelled by the special train.

On July 7th the body was brought across from Belgium by a destroyer, and, on landing at the pier at Dover, was received by the Admiral and the General Commanding at Dover, and representatives of the Great Eastern Railway, including Mr. J. Kenneth Foster, a director; Major-General Sir H. W. Thornton, K.B.E., General Manager; Mr. C. Busk, Continental Traffic Manager; and Mr. Arnold Aronovici, General Continental Agent.

On Tuesday, July 8th, the train conveying the coffin arrived at Charing Cross shortly before 11 a.m. When it drew in, the saloon conveying the coffin stopped at a point where a group of men from the Great Eastern Marine Department were stationed. The Great Eastern Railway was represented by Lord Claud Hamilton, Chairman; Sir Ailwyn Fellowes, Deputy Chairman; Sir Eric Hambro, Mr. H. G. Bailey, Mr. Foster and Sir Charles Ellis, Directors; Major-General Sir H. W. Thornton, K.B.E., General Manager; Mr. S. A. Parnwell, Assistant General Manager; Mr. F. G. Thurston, Secretary; Mr. A. J. Hill, Chief Mechanical Engineer; Mr. C. Busk, Continental Manager; Mr. A. Aronovici, Continental Agent; Mr. T. Chew, Solicitor; Mr. E. E. Barton, Audit Accountant; Mr. A. E. Dolden, Accountant; Mr. A. Thorpe, Stores Superintendent; Mr. J. Miller, Chief Engineer; Mr. F. W. Noal, Marine Superintendent; and Dr. MacMahon, Medical Officer.

The body was placed on a gun-carriage drawn by bluejackets, four of the pall-bearers being captains of Great Eastern Railway steamers. In the carriages following were relatives, together with the chairman and directors and officials of the Great Eastern Railway. Officers and representatives of many other railways also were present at St. Paul's Cathedral, where the following music was played by the orchestra of the Great Eastern Railway Musical Society, under Colonel W. J. Galloway:—Handel's "Largo in G," Sullivan's "In Memoriam" Overture, Purcell's "When I am laid in earth," and Bach's "Meditation." After the service "Abide with me" was sung, and the Dead March in "Saul" played. While the body was being carried to the west door of the Cathedral Chopin's "Marche Funebre" was given. A great gathering of men and women had met to do honour to the memory of Captain Fryatt, and among them were officials in uniform, railway guards, porters and seamen of the Great Eastern Railway. On leaving the Cathedral the coffin was taken through the City to Liverpool Street Station, large crowds doing reverence all along the route. At the station the booking hall, through which the coffin had to pass to the platform, was draped with flags, as was the Fryatt memorial tablet. Long lines of people stood on the opposite platform and on the bridges, while on the line and elsewhere railway workers grouped themselves.

At one end of the platform stood a massed band of the Great Eastern Railway Musical Society. A space near them was made beautiful by many flowers, wreaths, &c. Among the offerings were memorials from the engineers of the ss. *Brussels*, and the various departments at Liverpool Street Station.

As the train moved out at 1.45 p.m., the Great Eastern Railway massed bands played Chopin's Funeral March. Dovercourt was reached at 3.25 p.m., and escorted, as in London, the body was taken to the Upper Dovercourt Churchyard. There it was met by the Bishops of Colchester and Barking, and by the local clergy. The funeral service was continued at the graveside, and after the Benediction the buglers sounded the "Last Post."

Thus was laid to rest a gallant hero, whose name will go down through the ages as one who was faithful even unto death. The whole nation shares with the Great Eastern Railway pride that it has produced such a noble spirit, and sorrow for his martyrdom

The Great Eastern Railway directors are considering the question of a memorial to the late Captain Fryatt. A general memorial to the fallen among the men in the service is proposed in the form of an architectural addition to Liverpool Street Station.

English Railway Stockholders' Protection Association.

With the object of protecting the interests of all stockholders of the English railway companies in any settlement of the railway problem that may be proposed by the Government within the next few years, a strong movement is being launched by an influential group of stockholders, representing over £500,000 of English railway holdings.

The first step was taken on July 7, in the registration of the English Railway Stockholders' Protection Association, under the Companies' Act. It followed on a meeting of large stockholders in the English railway companies, held in the Cannon Street Hotel, London, on May 27 last, and its chief object, as stated in the Memorandum, is "to promote, safeguard, and protect in all respects, the interest of members as stockholders," and "for these purposes to take without any restriction, all such steps and measures as

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may be deemed necessary to secure fair treatment for stockholders at the end of the war at the hands of the Government or any other authority that may be instituted then or thereafter to deal with English railways." It proposes to act as intermediary between stockholders and the legislature, royal commissions, &c.. and will publish information, arrange meetings, establish branches throughout England and Wales, and carry on a general propaganda. Furthermore, it is prepared to co-operate with all or any of the boards of management of the English railway companies in furtherance of its objects.

The signatories, all of whom are largely interested in English railways, are :—Mr. J. B. Buchanan, of Wm. Jacks and Company, Iron Merchants ; Mr. C. W. Harrison, of J. and C. Harrison, Limited, Shipowners ; Mr. J. C. Taite, of Taite and Carlton, Electrical Engineers ; Mr. Percy Mortimer, J.P. ; Mr. J. H. Nunn, of J. L. Hancock, Limited, India-rubber Manufacturers ; Mr. Fred J. Varley ; and Mr. G. H. Hargreaves.

Besides the above, there are also on the Executive Mr. A. B. Bosher, of A. B. Bosher and Company, Steel Manufacturers, Sheffield, Member of the Proprietors' Audit Committee of the South Eastern Railway ; Mr. K. W. Hedges, M.I.C.E. ; Colonel R. G. Hopkinson ; Mr. John Varley ; Sir Wm. F. Clerke, Bart. ; Mr. L. H. Powell, of L. Powell and Sons, of the Stock Exchange ; Mr. Leonard James, Barrister-at-Law ; and Mr. B. H. Drake, of Drake, Son and Parton, Solicitors. The Executive is to be largely increased and to embrace representatives throughout England and Wales.

This Association is organised on similar lines to the Scottish Railway Stockholders' Protection Association, which is doing such useful service for the holders of Scottish railway securities, and will work in co-operation with it. All holders of English and Welsh railway stocks or securities are asked to become members of the Association to enable the Association to act as their authorised representative, and to defend their common interest.

Under the Articles of the Association, membership can be obtained by a single subscription of not less than 2s. 6d., nor more than two guineas. Applications for membership, and all enquiries should be addressed to the Secretary of the Association, 5, The Sanctuary, Westminster, S.W. 1.

London's Travel Problem : Important Facts and Figures for the Select Committee of Inquiry.

EVIDENCE of the greatest importance to the travelling public, as well as to the vast railway, omnibus, and tramway undertakings in the London area, was given before the Select Committee on Transport at the House of Commons. The chief witnesses were Mr. Frank Pick, the commercial manager, and Mr. Herbert E. Blain the operating manager, of the Underground Group of companies.

" The Underground Group," said Mr. Pick, " has always regarded itself as a public utility undertaking, and, as such, has always had a public policy." He dealt at length with the great restrictions placed upon the operations of the companies during the war, pointing out that nearly 16,000 employees had been called to the colours, and 1,319 'buses and seven garages taken for war service. Under these circumstances, he declared, " the best has been done with the physical capacity of our undertakings for transport."

Describing the growth of traffic which had led to the present congestion, he gave the following statistics of the local passenger traffic of Greater London. These figures take no account of the local passengers on the main-line railways (estimated in 1913 at 250,000,000), or of the passengers carried in cabs (also estimated in 1913 at 50,000,000).

Apart from these the total passengers carried locally were :—

	1913.	1918.
Railways ..	462,019,537	699,000,000
Tramways ..	811,397,317	992,000,000
'Buses	733,931,201	682,000,000
Total ..	2,007,348,055	2,373,000,000

These figures show that while the railway traffic increased by 237,000,000 and the tramways carried an extra 180,600,000, the 'buses lost about 52,000,000 passengers. The total number of journeys per head of the population, however, appear to have risen to 321, or 50 more per head than in 1913.

Coming to the figures of the Underground Group, he showed that the traffic of these companies as a whole had increased from 797,000,000 passengers at an average rate of 1·48d. per passenger in 1914 to 901,000,000 at 1·83d. in 1918.

There had, however, been an enormous expansion in the cost of working, and to this was entirely due the increase in fares. These higher fares were completely justified. The general level of the increase of working expenses on the railways is just over 100 per cent. The largest increase—143 per cent. —is in the cost of electricity, due to the enhanced price of coal. Yet the final average increase in the rate of fare charged, allowing for all factors, may be taken at not more than 33 per cent.

The companies, said Mr. Pick, had always looked forward to a time when the traffic density of their routes, properly worked,

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would be sufficient to yield a dividend of over 4 per cent. That was the expectation —not yet realised—with which they ventured their money, and to seek to realise it in all fair ways is no extravagant demand and no blameworthy profit-taking. Now that money is costing over 5 per cent., the whole future development of London transport hinges on the degree of success which can be attained with the money already spent.

In conclusion, Mr. Pick described the extensions and improvements in contemplation, and stated that the Underground Railway Companies are committed to an expenditure of about £3,650,000 within the next few years, largely for modernisation and completion of the existing railways as a single system.

Mr. Herbert E. Blain also dealt, in his evidence, with the traffic congestion, quoting figures applying to periods before, during, and since the war. But for the undoubted patriotism of the companies in carrying out, and even anticipating the demands of the Government in war time, he declared, the congestion in London to-day would not have approached anything like what it is.

The war traffic figures for the four underground railways—the Metropolitan District, London Electric, City and South London, and Central London—for the last four years were as follows :—

	Car Miles run.	Passengers carried.
1915	56,817,348	254,594,093
1916	59,234,461	285,967,067
1917	63,585,077	338,727,664
1918	63,768,765	379,438,072

As in the figures quoted by Mr. Pick, this table by Mr. Blain indicates that, despite the increased facilities, the growth in the number of passengers has outstripped these facilities. At the same time, however, the expenditure was going up enormously. The cost of the eight-hour day is being added to each week, as additional rolling stock is put into service, necessitating the employment of a larger staff. The increased salary and wages bill of the Company now amounts to no less than £2,245,000 per annum.

Mr. Blain then referred to the remedial expedients employed to meet the abnormal traffic conditions, such as the erection of regulating barriers and gates on railway platforms, the formation of 'bus queues, and the "Safety first" campaign aimed at reducing the number of accidents to the travelling public.

Finally, Mr. Blain put forward a number of suggestions, the chief being that the police should have new powers for regulating and controlling the routes of slow-going and stationary traffic, that there should be simpler procedure with regard to queues and fixed stopping-places for 'buses, that the authorised speed of motor-buses should be raised to 16 m.p.h., and that there should be a concentration of everything affecting traffic in the London area in the hands of one expert authority.

"Behind the Front in France."

ARISING out of P.C.L.'s article under this title in the May, 1919, RAILWAY MAGAZINE, the principal items from a letter from a late Army chaplain may be referred to in conjunction with the author's comments thereon. It is pointed out that there were many Belgian engines in use by the R.O.D., and these, though not recognised by P.C.L., appear to be the "square-funnelled" engines ascribed to the C. de Fer du Nord. Various classes of these Belgian engines are mentioned, both of the old types and of the modern series derived from the Caledonian locomotives supplied from England about 20 years ago. Of British locomotives, some of the Great Northern and Great Western 0-6-0's were fitted with condensing apparatus. Most of the Great Central engines were at Audriacq, hence their commonness at St. Omer. Besides 0-6-0's, there were 0-8-0 N.E.R., G.C.R. and L.N.W.R.; 2-6-0, G.W.R. (5000 class); 0-6-2 T, L.B. and S.C.R.; 0-6-0 T, S.E. and C.R.; 2-8-0, Canadian; 2-8-0, 4-6-0, 2-6-2 T, 0-6-0 T, and 0-4-0 T, Baldwin's (U.S.A.); 2-8-0 of G.C.R. type, built by various firms; 2-8-0, New South Wales, sent to France from the North British Locomotive Company's works without delivery to Australia; 4-6-4 T for a Dutch Railway, built by Beyer, Peacock & Co.; 0-6-0 T built by Kerr, Stuart & Co., &c. Another correspondent, who also refers to the Belgian engines in France, mentions a train composed of Italian and French coaches, hauled by Belgian and Great Eastern 0-6-0's and banked by a Lancashire and Yorkshire 0-6-0.

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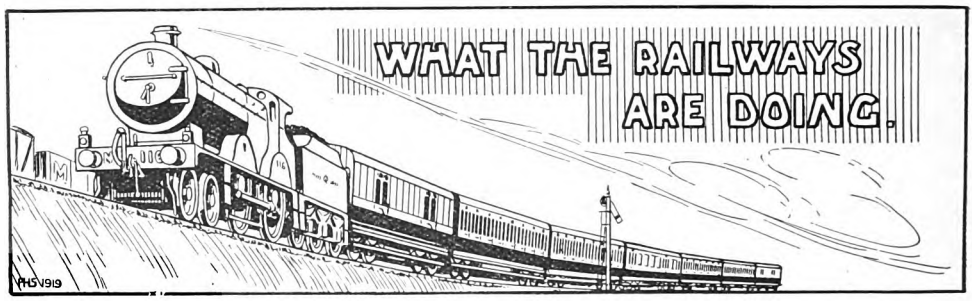

MR. SIDNEY ARTHUR PARNWELL, Secretary and Comptroller, Great Eastern Railway, has been appointed Assistant General Manager of the same company. Mr. Parnwell will continue to carry out the duties of Land Agent of the Great Eastern Railway. Educated at the City of London School and the Huntingdon Grammar School, he commenced his career in the office of a firm of auctioneers in Huntingdon. He then came to London and was articled to Mr. Daniel Watney, of the firm of Daniel Watney & Sons, Land Agents and Surveyors. During this period he passed the examinations of the Surveyors' Institution. Later he joined the staff of Mr. W. H. Elwell, Surveyor to the Great Northern Railway, and on that gentleman's retirement acted as Assistant to Mr. A. J. Brickwell, subsequently becoming Chief Assistant. In January, 1909, when the office of Land Agent to the Great Eastern Railway became vacant, Mr. Parnwell was appointed to fill the position. During 1915 and 1916 he also acted as Assistant to the General Manager, until on the death of Mr. Lomas he was appointed to the position of Secretary and Comptroller, still retaining his duties as Land Agent. Following the death of Mr. Wm. C. May, Chief Traffic Manager, Mr. Parnwell served as Acting General Manager during the remainder of the period during which Major-General Sir Henry W. Thornton, K.B.E., was absent on Government service.

Mr. SIDNEY A. PARNWELL,
Assistant General Manager,
Great Eastern Railway.

At a meeting held at the Railway Clearing House, London, on July 4th, the opportunity was taken to present Mr. W. Slater, who recently retired from the position of Deputy Assistant Goods Manager of the Lancashire and Yorkshire Railway, with a writing bureau, brass inkstand, and diamond pin convertible into a stud, to mark the esteem in which he was held by the railway officers with whom he came in contact at the various goods traffic conferences held at the Clearing House. Mr Antill, Midland Railway, in making the presentation, said that Mr. Slater had been attending the Clearing House for 30 years as the representative of the Lancashire and Yorkshire Railway. His colleagues were sorry to part with an old friend who, by his intelligence and persuasive way of presenting his views, had been of such great assistance at the railway conferences, and they hoped he would be long spared to enjoy his well-earned retirement. Mr. Dyson, of the North Eastern Railway, spoke of the regret which all felt in losing Mr. Slater's assistance, and mentioned that Mr. Slater could not only put his own case forward in an able manner, but could listen and appreciate the views of others, and was always willing to give assistance to the novice. Mr. Slater expressed his warm thanks to the members for their gifts, which would daily remind him of the Railway Clearing House. One thing he had particularly noticed was the complete

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change of personnel which had taken place during recent years, and he thought that with one exception all members who attended when he first came to the conferences had now given place to others. Mr. Slater also referred to the pending changes in connection with the railways, which would no doubt bring very strenuous times to his old colleagues, but he knew that, given health and strength, they would face the task with ability and judgment.

* * *

MR. SAMUEL PITT, joint Midland and London and North Western Stationmaster at Buxton since October, 1907, has been promoted to be Headquarters Inspector on the staff of the General Superintendent. He entered the Midland service at Nailsworth in 1884, in 1898 was made Stationmaster at Rowsley. In 1902, when the Superintendent of the Line took over the working of goods and mineral trains, Mr. Pitt was entrusted with the charge of the goods station and also the marshalling sidings at Rowsley, in addition to the passenger station. On four occasions when King Edward visited Chatsworth Mr. Pitt carried out the arrangements for His Majesty's arrival and departure, and in January, 1906, he was presented by the King with a scarf pin. He also controlled the arrangements for the visits to Rowsley for Chatsworth of the late King of Portugal, the Prince and Princess of Wales, Prince Christian, and the Duke and Duchess of Connaught.

* * *

FORMERLY General Manager of the Barry Railway, Mr. T. H. Rendell has been appointed a director of the Company in place of the late Mr. Thomas Roe Thompson, M.P. Mr. Rendell won his way to the front in railway affairs purely on merit. He commenced service with the Great Western Railway in 1870, and from station work rose step by step until in 1904 he became Chief Goods Manager. In 1912 he left the Great Western Railway to take office as General Manager of the Barry Railway. In March, 1919, Mr. Rendell retired, and was succeeded by Mr. W. Waddell, M.Inst.C.E.

* * *

MR. F. SAWARD, who for the past 7½ years has been London Cartage Manager for the Great Northern, Great Central and Great Eastern Railways, has retired. Mr. Saward entered the service of the Great Eastern Railway as a junior clerk at Ware Station in 1873, and after passing through the routine of station work, was transferred to the Chief Rates Office at Liverpool Street. He subsequently occupied the positions of District Canvasser in the Colchester and Norwich districts, Chief Clerk in Rates Office, and Clerk in Charge of Ledger Accounts Office, Liverpool Street, leaving London in 1892 as District Traffic Superintendent, Lincoln, and in 1897 took up the position of District Goods Manager at Ipswich. He left Ipswich in 1910 to take the position of London District Goods Manager. In 1912 the Great Northern, Great Central, and Great Eastern Railways decided to amalgamate their London cartage under a joint committee of directors, and Mr. Saward was selected as Manager, and has been successful in effecting very considerable savings in the cost of cartage to the three railways. As the result of experience gained, Mr. Saward

Mr. F. SAWARD,
London Cartage Manager,
G.N., G.C. and G.E.R., 1912-19.

is convinced that a general amalgamation of railway cartage in London would be productive of enormous reduction in cost of cartage to the various railways serving the metropolis.

* * *

CAPTAIN THE HON. WILLIAM J. SHAUGHNESSY was elected a director of the Canadian Pacific Railway, to fill a vacancy caused by the resignation of the Hon. James Dunsmuir, of Victoria, B.C. Captain Shaughnessy is the son of the Right Hon. Lord Shaughnessy, who was for 19 years the President of the Canadian Pacific Railway and is now the Chairman of the Board. Educated at Laval University, Montreal, and Cambridge,

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England, Captain Shaughnessy is a prominent Montreal lawyer. During the war he saw three years' service overseas, leaving Canada as Captain and Adjutant of the 199th Irish Rangers, recruited in Montreal, and was in charge of the arrangements for the battalion's notable tour of Ireland. On the breaking up of the Irish Rangers, he was sent to France as aide-de-camp to Brigadier-General Sims, the Canadian representative at British General Headquarters. After serving with considerable distinction in this capacity for some time, Captain Shaughnessy was transferred to the headquarters of the Canadian corps, acting as aide-de-camp to Lieut.-General Sir Arthur Currie, the corps commander.

* * *

MR. T. O. B. OTWAY-RUTHVEN, who has become Chief Mechanical Engineer to the Nigerian Railways, entered the service of the London and North Western Railway 30

Mr. T. O. B. OTWAY-RUTHVEN,
Chief Mechanical Engineer,
Nigerian Railways.

years ago, and served his time under the late Mr. Webb at Crewe Works. He then joined the London, Brighton and South Coast Railway, and became District Locomotive Superintendent at New Cross and Battersea. He later was Locomotive Superintendent on the Baro-Kano section of the Nigerian Railways, and subsequently the Chief Locomotive Engineer of the whole system. Mr. Otway-Ruthven is taking up his new position at a noteworthy period, because it is intended in the immediate future to reconstruct the Nigerian Railway's locomotive works.

* * *

MR. J. G. CASTLES, who has been made General Manager of the Great Western of Brazil Railway in succession to Mr. H. O. Jungstedt, has had a varied railway experience both in Great Britain and in South America. Born in 1884 at Narberth, Pembroke, he was educated at Colston School, Bristol, and King Edward VII Grammar

Mr. J. G. CASTLES,
General Manager,
Great Western of Brazil Railway.

School, King's Lynn. In 1901 he entered the service of the Great Northern Railway as Probationary Clerk, and after training in station work went in succession to the Audit Office, General Funds Office, Secretary's Department and Book-keeping Office, remaining with the Great Northern Railway until 1905. In that year he left England to join the Entre Rios Railways, entering the Accounts Department to begin with. Mr. Castles was afterwards Chief Traffic Clerk, and carried through various revisions and re-publications of the Railway's rates. He was also employed during this period on special commissions on construction work. Then he was made Assistant Secretary to the Administration. During this period he took an active part in the organisation of the Marine Department, including the control of the ferry service. He was then appointed Acting Secretary, and subsequently Acting Traffic Manager. In November, 1912, he became Secretary to the Administration and

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held this position until June, 1913. Later in the same year Mr. Castles went to the Great Western of Brazil Railway as Traffic Manager. In 1916 he was appointed Assistant to the General Manager.

* * *

APPROACHING departure of Canadian troops from Seaford Area, occupied by them since October, 1916, has been made the occasion of a presentation to the popular Stationmaster, Mr. Harold J. Hollingdale, whose ever willing services and cheerful personality during three very strenuous years have been much appreciated by the Headquarters and Regimental Staffs. The presentation took the form of an autographed photograph framed in rich dark oak; showing the General Headquarters Staff with Mr. Hollingdale on platform at Seaford Station, also a handsome oaken cabinet or canteen of cutlery and plate, the work of the Goldsmith and Silversmiths' Co., Ltd., Regent Street. An inscribed brass plate with the maple leaf in bold relief bore the following: "Presented to H. J. Hollingdale, Esq., as a slight expression of appreciation of his splendid co-operation whilst Stationmaster at Seaford during the occupation of Seaford Camp by Canadian Troops, October, 1916, to July, 1919." Lieut.-Colonel D. H. Barnett, M.C., A.A.Q.M.G., in making the presentation, alluded to the heavy and continuous work thrown upon the railway staff, and of the excellent manner in which everything had been conducted, rendering their associations of the happiest nature. Mr. Hollingdale's unvarying courtesy and helpfulness throughout would never be forgotten by the Canadians. In conclusion Colonel Barnett wished Mr. and Mrs. Hollingdale many years of health and happiness, and that the cabinet might prove a useful and ever constant reminder of their Canadian friends.

* * *

THE RAILWAY MAGAZINE is notified that Mr. G. W. Cosby, the Northern District Representative of the Westinghouse Brake Co., Ltd., for the sale of Westinghouse-Morse "Rocker Joint" chains, has now been demobilised, and has re-opened his offices at Standard Buildings, City Square, Leeds, the same address as before the war, and any enquiries received by him will be promptly attended to.

* * *

THERE was a large gathering at the Café Monico, London, on Saturday, July 5th, when the Canadian Pacific Railway gave a banquet to Sir George McLaren Brown, the European General Manager, and to Lady McLaren Brown. Many of the Company's agents from different parts of Europe were

CANADIANS AT SEAFORD.

Military Officers reading from left to right:—Major S. W. Hobart; Major C. Porteous, M.C.; Lt.-Col. A. G. Turner, M.C.; Lt.-Col. Cecil L. Bott; Lt.-Col. D. H. Barnett, M.C.; Captain S. Wharton; Lieut. W. F. Shaw; Lieut. A. W. Bathurst, R.T.O.
London, Brighton & South Coast Railway Station Master, Mr. H. J. Hollingdale.

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present, and in the course of the evening presentations were made to Sir George and Lady McLaren Brown in honour of the knighthood conferred upon Sir George by His Majesty the King.

* * *

COMMANDER THOMAS FISHER, R.N., who has represented the British Ministry of Shipping in Washington during the past 18 months, has been permitted to retire in order to accept the appointment of General Manager of the Atlantic Lines of the Canadian Pacific Ocean Services, Ltd., with headquarters at 8, Waterloo Place, London.

* * *

FIVE members of the staff of the Caledonian Railway Company have received appointments on the Pekin-Mukden line of the Chinese State Railways. They have been selected at the request of Mr. W. H. Steel, manager of the system, who was formerly on the staff of the Caledonian Railway. The appointments are as follows: Mr. Andrew Binnie to be assistant traffic manager manager; Mr. Joseph Tait, audit inspector; Mr. James Park and Mr. Edward Palmer, traffic inspectors; and Mr. Robert Hall, chief audit accountant.

* * *

STAFF changes in the Locomotive Department of the Great Northern Railway consequent under Mr. Cole's retirement are: Mr. G. Oakes, District Locomotive Superintendent, Retford, to District Locomotive Superintendent, Doncaster; Mr. A. H. Peppercorn, Assistant to District Locomotive Superintendent, Peterborough, to District Locomotive Superintendent, Retford.

* * *

SUMMER Services include numerous alterations in London and North Western Railway train services. Foryd, Pont Rug, and Sankey Bridges stations have been reopened for passenger traffic, and Star Crossing (between Nannerch and Rhydymwyn) reopened for passengers only. Many of the additional trains run are of a holiday character, quite a number running between Birmingham and various Midland towns and the North Wales Coast or Blackpool. Some of these run during specified periods. In regard to main line trains from London, numerous additional trains are provided with restaurant cars or equipped for serving teas and light refreshments. The following train improvements may be referred to specifically. A new 10.40 a.m. train from Euston to the North Wales line, with a luncheon car through to Bangor. The 11 a.m. Liverpool express leaves at 11.5 a.m., and is expedited, while a new Manchester express, also non-stop to Crewe, is provided at 11.15 a.m., with luncheon car from London to Windermere, and through carriages to the Lake District. The 1 p.m. Scotch express is divided, the first portion serving Glasgow, where it is due at 10.30 p.m., while the second portion, at 1.10 p.m. (not available from London to Edinburgh) has through coaches for Whitehaven and Aberdeen. The Glasgow train has dining cars throughout, and the 1.10 p.m. a luncheon car from London to Crewe. The 1.20 p.m. Birmingham express runs 10 minutes later. The 2.25 p.m. express is divided, the Liverpool portion being non-stop to Crewe, while the Manchester portion leaves at 2.35 p.m. and continues the Rugby call. The 7 p.m. Birmingham express is altered to leave at 6.50 p.m., and a new Scotch express is provided at 7.10 p.m. (except Saturdays), with through carriages and sleeping saloons to Oban and Inverness. This calls only at Crewe to Carlisle. The 7.20 p.m. becomes a sleeping saloon express for Perth only. The 8.20 p.m. is also divided, the first portion leaving at 8.10 p.m. and running without publicly-booked stop to Holyhead. This conveys sleeping saloons to Holyhead. The 8.20 p.m. is booked non-stop to Crewe and serves Chester and Holyhead. On Saturday nights it has connections from Crewe to Leeds and Manchester. The 9.25 p.m. Scotch express is also divided, the first portion conveying Glasgow sleeping saloons, while the second portion calls at Tamworth and Carnforth, giving a Barrow connection, and reaching Carlisle 12 minutes later and Glasgow 20 minutes later. The return services are correspondingly arranged, and need not be referred to in detail. Many additional facilities in various districts are also provided.

* * *

THE Great Western Railway has reinstated its popular system of seat registration on certain trains. Seats can now be registered on payment of a registration fee of 1s. per seat, and a diagram of the seating accommodation can be seen and seats booked at the principal stations at which the trains call. Trains to which this scheme applies are:—10.30 a.m. Paddington to Penzance (through coaches to Falmouth, Ilfracombe and Minehead); 11.30 a.m. Paddington to Kingswear and Penzance (through coaches to Newquay and Kingsbridge); 9.45 a.m. Penzance to Paddington (through coaches from Kingsbridge); 11.30 a.m. Paignton to Paddington (through coaches from Minehead).

* * *

RECENT train alterations on the Lancashire and Yorkshire Railway are mainly of a

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detail character, with local additions. Among services benefitting are those between Colne and Earby, Bury and Bacup, Manchester and Bacup, Manchester and Radcliffe, Liverpool and Southport, Liverpool and Aintree, Southport and Crossens, Southport and Barton, &c. Rail motors between Southport and Ormskirk are replaced by steam trains. Burlington Road and Gillett's Crossing Halts have been reopened, and a rail motor service instituted between Blackpool and Lytham. Additional rail motors run between Ormskirk and Rainford Junction. Stocksmoor station has been reopened, and certain trains between Huddersfield and Penistone are scheduled to call there.

* * *

ON Tuesday, July 15th, the London Brighton and South Coast Railway resumed a day passenger service between London and Paris. The service was arranged to run tri-weekly from July 15th to the 25th, and daily (Sundays included) commencing on Monday, July 28th. During the tri-weekly period, the service left London on Tuesdays, Thursdays and Saturdays, and Paris on Mondays, Wednesdays and Fridays. The trains are 1st and 2nd class only, leaving Victoria 9 a.m., and arrive Paris (St. Lazare) at 6.45 p.m. The return train leaves Paris (St. Lazare) at 10 a.m., and arrives at Victoria 7.35 p.m.

* * *

LONDON AND SOUTH WESTERN RAILWAY time-tables this summer show a considerable remodelling of the services, and a great improvement in several instances in the direction of frequency, speed, and the provision of restaurant cars. The principle of departure from Waterloo at regular times, previously in operation for the electric trains, has been extended to some of the steam services. For example, trains leave Waterloo for Bournemouth on weekdays at the same time after the hour, viz., at 7.30, 9.30 and 11.30 a.m., 12.30, 1.30, 2.30, 4.30, 5.30, 6.30 and 7.30 p.m., and on Sundays at 11 a.m., 2, 5, and 7 p.m. Similarly, for the Portsmouth line, trains leave Waterloo on weekdays at 9.50 a.m., 12.50, 3.50, 4.50 and 6.50 p.m. With the exception of the 4.50 p.m., these trains call only at Guildford and Fratton. Luncheon and dining-car trains have been reinstated on the Waterloo and Portsmouth direct line; also additional breakfast, luncheon, and dining cars in the Bournemouth-Waterloo service, with luncheon cars on the Bournemouth and Birkenhead through trains. Another feature of the new service is the introduction of through trains from Reading to Portsmouth via Basingstoke and Eastleigh, leaving Reading at 8.49 a.m., 12.2 and 3.15 p.m., returning from Portsmouth at 8, 11.20 a.m., and 2.10 p.m. There are also, for the first time since the opening of the Midhurst branch in 1864, through trains from Midhurst to Portsmouth.

* * *

CHIEF alterations in the London and South Western West of England service are that the old 8.50 a.m. Waterloo to Exeter starts at 8 a.m., and runs to Plymouth with a connection to the North Devon line, while the 3.15 p.m. now leaves at 3 p.m., calling at Basingstoke instead of Woking and Andover Junction. The 10.15 a.m. up train from Exeter has been accelerated, reaching Waterloo at 2.30 p.m. instead of 2.54 p.m. The old 2 p.m. from Exeter now departs at 2.30 p.m. Making connection with it is a new train from Ilfracombe at 11.40 a.m., and from Torrington at 12 noon, Waterloo being reached at 7 p.m.

* * *

IN consequence of shortage of stock, electric trains have been entirely withdrawn from the Surbiton-Claygate section, London and South Western Railway, and from Wimbledon via East Putney line, with the exception of half a dozen trains in rush hours. These latter trains, from which several intermediate stops have been eliminated, cover the journey in 19 minutes, and should do much to relieve the congestion of the main line trains between Wimbledon and Waterloo. A 15-minutes service instead of half-hourly as hitherto now runs during the periods of business pressure between Waterloo and Shepperton. Trains run fast and slow alternately, the former, non-stop Waterloo to Norbiton, reach Kingston in 20 minutes. Earlsfield, Wimbledon and Malden now have a regular 5-minutes service.

* * *

THE extension of the Midland Railway from Margotsfield to Bath was opened 50 years ago this month—on August 4th, 1869. The running of the first train from Bath was unattended with any ceremony. The line was authorised in 1864, and was incidentally described by Mr. Herbert Rake in his exhaustive article, "The South Western Extension of the Midland Railway," in Vol. XIV of the RAILWAY MAGAZINE. When the line was first opened there were nine trains each way between Bath and Bristol on week days, and the present-day time-tables show only an increase of one in each direction.

* * *

THE Judicial Committee of the Privy Council recently sat at Dublin Castle to hear an application for an Order in Council

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extending for a period of two years the appointment of Mr. Henry Hunt as manager of the Londonderry and Lough Swilly (Letterkenny to Burtonport) Extension Railway, under the supervision of Mr. Joseph Tatlow, director of the Midland Great Western Railway Company, Ireland. The original Order of the Council was dated July 4th, 1917, and was amended by a further Order, dated April 29th, 1918, providing for the expenditure of a sum of £10,000 for the purpose of making the undertaking safe for public use. Mr Wilson, K.C., said under the terms of the application it was provided that a sum of £10,000 was to be expended on the permanent way, and keeping it in proper repair. Only a portion of that sum, viz., £1,369, had, however, been expended. It was also found that, besides the permanent way, the locomotives and passengers' carriages required looking after, and there was a second Order obtained for that purpose. At present the permanent way is in better condition than it was at the time the Order was made, but it was not quite safe for the public as yet, and it was considered desirable that the Order should be extended until the full amount originally contemplated was expended. In reply to Mr. Justice Dodd as to why in the interval since the Order in Council had been made the work had not been completed, Mr. Wilson said that, owing to the war, it had been found impossible to get the necessary material. Counsel referred to the reports submitted by Messrs. Tatlow and Hunt as to the general condition of the line, and said they showed that very good work had been done in putting the line in order. The Lord Chancellor remarked that the results were exceedingly creditable to the gentlemen concerned. Mr. Wilson said that the present application was that their lordships would make an extension of their original Order for a period of two years, so that the unexpended money might be applied to the completion of the work. An Order was made by their lordships extending the period for two years, or from such date as the Board of Works certified that the money had been satisfactorily expended, when an application to determine the Order may be made to the Council.

* * *

IN a White Paper dealing with the cost of naval and military operations during the war, and including the report of the Comptroller and Auditor-General, it is stated that for the year ending March 31, 1918, there was paid to the Railway Executive Committees of Great Britain and Ireland a total sum of £25,286,326 19s., and the total of the payments made during the period from August 5, 1914, to March 31, 1918, was £55,759,766 17s. 3d. The probable deficit in 1918–19 is estimated at £48,500,000.

* * *

THE latest report of the Light Railway Commissioners, covering proceedings to the end of 1918, points out that up to the date of the report the total mileage of all classes of lines applied for under the Light Railways Acts since 1896 is 5,051 miles, and the Orders confirmed by the Board of Trade authorise the construction of 2,101 miles, of which about 900 miles have been actually constructed. Of these about 550 are on lands acquired, *i.e.*, are light railways in the ordinary sense of the word; and about 350 are an roads, being mainly in the nature of electric tramways. Of the 550 miles on londs acquired, about 325 are either owned or worked by existing main line railway companies. Commenting on the small amount of light railway mileage constructed by independent promoters, the report observes that, except in cases where the prospect of some particular traffic, or the furtherance of some definite interest, may invite capital from independent sources, the provision of light railways will have to be made out of public money, whether from local or national sources, and under consequent public control. The report also notes special features attaching to the independent promotion of the eight Orders submitted to the Board of Trade during 1918. Of these Orders, two (Edge Hill and East Kent) are mainly for mineral traffic, iron ore and coal respectively; three (Formby, Swansea and Lostock) are principally for passengers in the neighbourhood of large populations; the remaining three (de Trafford, Hooton and Nottingham) are promoted for industrial organisation and equipment of selected areas of land (on the lines of the Trafford Park Estate), starting for this purpose with the provision of special transport facilities.

* * *

WE understand that a number of the large 2-8-0 engines built for War Office use to the designs of Mr. J. G. Robinson, of the Great Central Railway, are now being taken over by the railways of this country. Preliminary arrangements have allocated 30 to the London and North Western Railway (of which the first five are numbered 1633, 1642, 2022, 2023 and 2089), and these are employed mainly north of Stafford, as their distribution of weight is not at present suitable for certain underline bridges south of that point. The Great Western Railway is taking 20, numbered from 3000 upwards, and these are in use principally on the north main line. All the engines concerned retain their Westinghouse brake equipment, side

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chains, lifting jacks, and other special equipment for France, together with their characteristic Great Central Railway appearance. We believe that a few of this type are also going to the Midland Railway.

* * *

A DALRY reader sends some notes concerning the Glasgow and South Western Railway. Progress is again being made with the Dalry and Kilwinning widening, and it is expected to complete the laying of the track by the autumn, which will give four roads through from Glasgow to Kilwinning, and greatly facilitate the working of the heavy coast traffic. As regards the locomotives, an entire renumbering is taking place, somewhat on the lines of that already adopted on the Midland line. Engines previously on the duplicate list are numbered from 700 upwards. A transformation in the appearance of the leading end is being effected by the removal of the "wings" on either side of the smokebox of all the engines possessing them, as has already been done in the case of numbers of Caledonian Railway engines.

* * *

CALEDONIAN RAILWAY 4-4-0 engines of the "Dunalaistair" II. and III. classes which have been rebuilt with superheater boilers include the following: Nos. 766, 769, 771, 772, 894, 898, 900, 901, 923, and 924. A Kirkintulloch reader mentions these and also states that "Drummond" 4-4-0's Nos. 60, 62, 87 and 115 have been renumbered respectively 17, 87, 1087 and 85; while he understands that Nos. 63, 65, 85 and 17 have been scrapped. He also asks where the 0-4-2 saddle tanks Nos. 262 and 263 are now employed, and the number of the single2-4-2 tank engines still remaining.

* * *

A NUMBER of the Holmes 4-4-0 engines on the North British Railway have been rebuilt by Mr. Reid and fitted with large boilers, Robinson superheater and new cabs. Among them may be mentioned Nos. 633, 637 and 642 and 695. Mr. Zamorski of Kirkintilloch writes that the following new 0-6-0 engines were built last year: Nos. 292, 297, 304, 454, 455, at Cowlairs Works; Nos. 88, 89, 123, 139, 151, 157, 158, 161, 162, 167, 274, 295, 305, 314, 315, 456–469, 476–480, by the North British Locomotive Company, Limited. 4-4-0's previously 476–479 are now renumbered 1321–1324. Five new "Glens" have been built this year, Nos. 242, 270; "Glen Garry," 278, 281 and 287.

* * *

IN reference to a recent reply concerning London and North Western Railway locomotives observed at Kettering, Midland Railway, Mr. S. F. Geary mentions that there has been in operation for some time past a regular London and North Western Railway goods working from Bescot for Lloyd's Sidings *via* Rugby and Market Harborough, usually taken by an ordinary 0-8-0 engine.

* * *

A FURTHER series of 4-6-0 passenger engines (*Prince of Wales* class) will shortly be in service on the London and North Western Railway, as follows: Nos. 33, 388, 1123, 1215, 1351, 1437, 1670, 1732, 2073, 2285. The engines replaced—all *Special* tanks—have been renumbered 3050, 3407, 3426, 2440, 3513, and 3651–55 respectively. Nos. 1901 *Jubilee* and 1902 *Black Prince*, four-cylinder compounds, have been converted to two-cylinder simples, "Renown" class. No. 859 is the latest four-cylinder compound goods engine to be simplified and superheated. Another of the celebrated 18-in. goods class has been withdrawn, No. 812. The following 0-6-0 coal engines which recently returned from overseas, are now in service again: Nos. 1098, 3244 and 3291.

* * *

NEW 0-6-0 side tank engines on the Great Northern Railway are Nos. 211–220.

* * *

MR. G. ROBINSON, of Doncaster, mentions a coincidence of engine numbers which recently came under his notice, Nos. 265 and 266 (both "Atlantics") being together on a London–Leicester express, Great Central Railway, while No. 365 *Sir William Pollitt* worked the train onwards.

* * *

IN answer to a question in Parliament, Captain Guest (Joint Parliamentary Secretary to the Treasury) recently stated that 423 locomotives owned by British railway companies are still retained in France; 36 have been returned, and the remainder are being returned as they can be released and as speedily as trans-Channel facilities permit. There are in addition 786 locomotives in France which are the property of the War Department.

* * *

IT is understood that the Canadian Pacific Railway liner, *Empress of Britain*, is now on her last voyage as a transport, and it is more than likely on her return she will be placed in the builders' hands for reconditioning. Her history since the outbreak of war is an interesting one. At the time of the declaration of hostilities she was at Quebec, and was immediately requisitioned by the Government as an armed cruiser to be fitted on her return to Liverpool. She arrived at Liverpool p.m. of August 15th, docking on

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the 16th after disembarking her passengers. She discharged a full Canadian cargo, mounted eight guns, all passenger accommodation was stripped out, and vessel commissioned under the command of Captain Pyddoke, R.N., and sailed from Liverpool on August 23rd for patrol duties in the neighbourhood of Gibraltar, Azores, and West Coast of Africa. She returned to Liverpool on March 11th, 1915, and was converted into a transport, sailing on May 23rd with 4,500 officers and men for the Mediterranean. She has been engaged as a transport in various waters, *i.e.*, Mediterranean, North and South Atlantic, and Southern Indian Ocean, also Arabian Sea. She was released from Transport Charter in March, 1919, and went under Liner Requisition. From the time the vessel was taken as a transport up to present month (July) she has (on Government service) steamed a mileage of over 202,000 and carried 135,366 officers and men (Imperials, Canadians and Americans), being under the command for the major portion of the period of Lieut. W. Main, R.N.R., and Commander G. Webster, R.D:, R.N.R.

* * *

THE ss. *St. George* was bought by the Canadian Pacific Railway in the latter part of 1913, and was sent to the Bay of Fundy for running in that service, namely, between Digby and St. John N.B. At the outbreak of war she was commissioned by the Canadian Government and stationed off the North American coast. Later she went to the West Indies and brought back German prisoners for internment in Canada. In the early part of 1915 she was sent from Canada to England to be fitted as a hospital ship, arriving at Southampton in May, 1915. While so engaged, *i.e.*, from date of commission, June 26th, 1915, to December 31st, 1917, she made 148 trips from Southampton to French ports and return, and carried the following invalids and wounded: 2,419 officers and 44,387 other ranks, making a total of 46,806. Early in 1918 she was converted from a hospital ship to a transport, and was so engaged up to June 28th, 1919, when her service terminated. While so occupied she made 120 trips between Southampton and French ports, carrying 11,940 officers and 204,979 men, making a total of 216,919. Throughout the whole of the engagement above referred to the vessel was not laid off for any defect. At the time of the "Push" last year, the Admiralty commended her Commander for the expeditious way in which he had taken his vessel to and fro, having made the 22 trips and carried 21,193 (all ranks) inside of one month.

* * *

IN the House of Assembly, Cape Town, the Hon. H. Burton, Minister of Railways, communicated a telegram from General Botha, which stated that the Imperial Government has given the Union Government railway materials to the value of £500,000 for national services rendered.

* * *

THE Railway Committee of the Dominion House of Commons has reported favourably on the Bill to incorporate the Great North West Route, Limited, the promoters of which include Viscount Templeton, Sir John Keltie and Messrs. Thomas L. Gilmour, Bernard Spring-Rice, Ernest Somers and Harry Craufurd. The scheme comprises the construction of a railway from the westerly end of Baker Lake to old Fort Reliance, on the Great Slave Lake, which will tap the oil-fields and convey fish to Hudson's Bay.

* * *

Now that the war is over the further improvement of railway facilities in that State is being attended to by the Queensland Government. The Burnett District is to be tapped by the construction of the Many Peaks to New Cannindah Railway. The starting point for the feeders for the New Cannindah terminus will probably be Rannes, Wowan, or Dalgangal. The Cabinet has approved of the necessary spur lines being surveyed at the earliest possible moment, in order that these lands might be made available, and to permit of the Lands Department proceeding with the cutting up of the land, so as to arrange that its road system should fit in with the railway system. As a result of the conference the Commissioner for Railways has been instructed to arrange for the Railway Department to begin at once the establishment of three survey camps, which will start operations immediately, beginning probably at the three principal points. All these railway lines will connect with New Cannindah, and will have Gladstone as their chief port. The proposal to extend the railway from Many Peaks to New Cannindah, a distance of 31 odd miles, at a cost of £565,000, was before Parliament last session.

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Frontispiece: Highland Railway Engine No. 51.
Midland Railway Locomotive History.
Clapham Junction—Its Remarkable Traffic.

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SAM FAY, *General Manager.*

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THE RAILWAY MAGAZINE.

4-6-0 EXPRESS PASSENGER LOCOMOTIVE ("CLAN" CLASS): HIGHLAND RAILWAY.

MR. C. CUMMING, Locomotive, Carriage and Wagon Superintendent.

Fitted with Robinson Superheater and Wakefield Mechanical Lubricator.
Cylinders: 21 in. × 26 in. Coupled Wheels: 6 ft. diameter. Bogie Wheels: 3 ft. diameter. Steam Pressure: 170 lbs. per sq. in.
Heating Surface: Tubes, 919 sq. ft.; Firebox, 139 sq. ft.; Superheater, 409 sq. ft.; Total, 1,467 sq. ft.
Tender capacity: Water, 3,500 gals.; Coal, 7 tons.
Weight of Engine and Tender in working order, 104 tons 6 cwts. 2 qrs.

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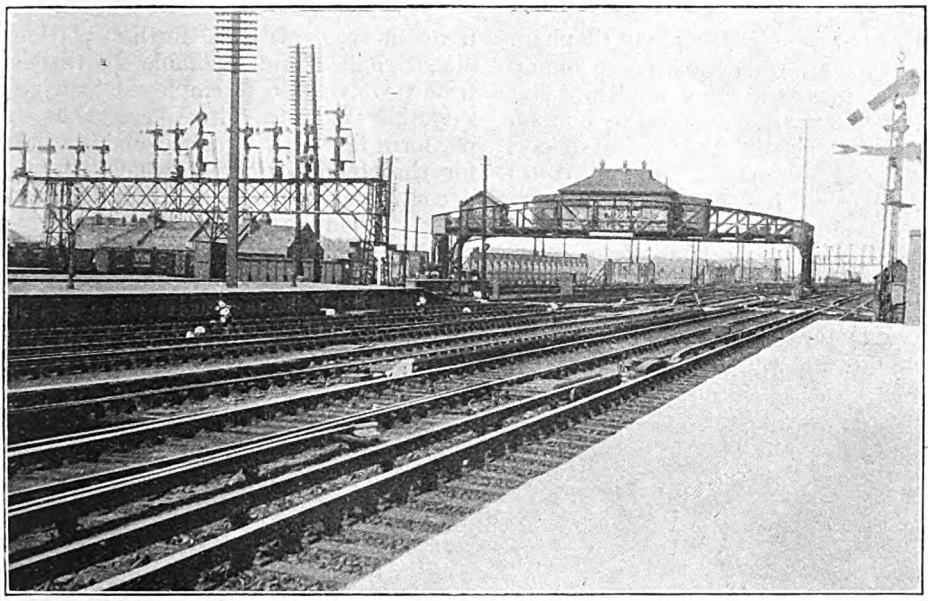

Photo.] [*J. F. Gairns.*

THE EAST SIGNAL CABIN (POWER OPERATED), LONDON & SOUTH WESTERN RAILWAY SECTION.

Showing also up signal gantry for platforms Nos. 1 and 2.

Famous Railway Junctions and Their Traffic.

CLAPHAM JUNCTION: LONDON & SOUTH WESTERN AND LONDON, BRIGHTON & SOUTH COAST RAILWAYS.

By J. F. GAIRNS.

EVERYONE who has observed traffic working at Clapham Junction will admit that this great station is fully entitled to all the fame with which the general travelling public has endowed it, for there can hardly be another station in the world to compare with it, either in regard to total numbers of trains calling or passing within the space of 24 hours, or having an equally large number of platform faces in constant use, and mainly for non-terminal traffic.

But although from the public point of view Clapham Junction is one station, it is actually constituted, operated, organised, and staffed as two distinct stations, belonging respectively to the two great railways in whose time-tables it figures so prominently. To be exact, there are, in fact, three stations, for two lines, with their platform faces, correctly belong to the West London Extension Railway, except that the London & South Western Railway is only nominally included with the London, Brighton & South Coast, London & North Western, and Great Western Railways in this ownership, in view of its access to the Extension line from its own side of the station. These two lines are, however, included for working and staff purposes in the Brighton section of the station, and it will be sufficient to accept them on that basis.

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A somewhat peculiar fact about Clapham Junction is that, while ranking so highly for traffic purposes, the tendency has been for some years to centralise London main line traffic on the two railways concerned at Waterloo and Victoria respectively, so that Clapham Junction is now considerably more of a traffic junction than one involving large interchanges of passengers, parcels, and luggage. This phase of traffic is, indeed, still a very large factor, but long-distance travellers now proceed usually to and from the chief termini in London itself, and quite a number of important express trains on both lines pass Clapham Junction without calling. Interchange is therefore more particularly of a local character, or associated with connections *via* Addison Road (Kensington) and the West London and West London Extension Railways.

But even as a traffic junction pure and simple there can hardly be an equivalent anywhere else. There are no fewer than twelve running lines through the station, all with platform faces, and each conveying a constant stream of traffic, besides four others in regular though less frequent use, with a further platform line, signalled and available for through traffic, which also is employed to a considerable extent. There are thus 17 platform lines, all signalled and available for through working, of which 12 carry a continuous succession of trains, aggregating about 2,400 daily, stopping or passing. Numbering of the platforms is somewhat confusing to the novice, seeing that these 17 platform faces are numbered only from 1 to 12. This is due to the varying practices of the two railways concerned. Nos. 1, 2, 3, 4, and 5 are all double-sided, and serve two lines each; Nos. 6 and 7 represent the two sides of another island, though, as the division line of the station occurs here, one is South Western and the other Brighton; Nos. 8 and 9 and 10 and 11 are provided by two other island platforms; while No. 12 is single-sided only. This may appear somewhat unsatisfactory, but it is, in fact, quite logical in that Nos. 2, 3, and 4 all deal with trains in the same direction at both faces, and passengers may find their trains on either side; No. 5 serves up and down South

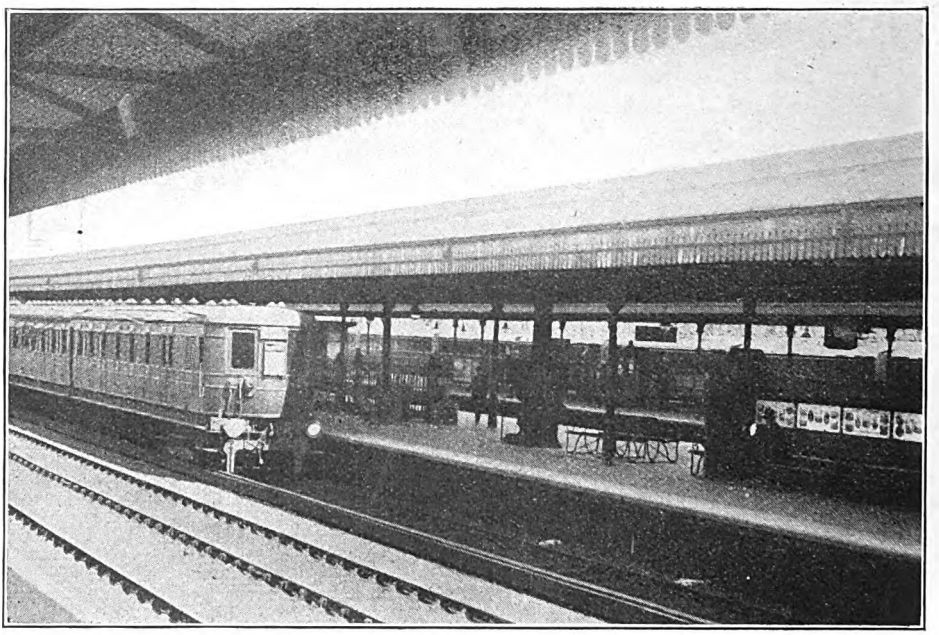

Photo.] UP ELECTRIC TRAIN AT No. 2 PLATFORM. [*J. F. Gairns.*

View from No. 1 platform, and showing middle road between Nos. 1 and 2.

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Western main line trains; Nos. 6 to 11 have trains of opposite direction on the two faces of the respective islands; and No. 1 is generally used for terminal traffic on miscellaneous local routes, so that there is no distinct train or direction classification on either side.

In effect Clapham Junction is approached from the London side by three distinct four-track main lines. Two of these necessarily figure upon an ordinary map as one, as they both come from Waterloo. But each has its own division of traffic, the West London Extension Railway comes in from Addison Road after passing under all the main lines, also connecting with the Battersea and Longhedge network of goods and interconnecting lines. South of the station the three four-track sections continue independently in their respective directions without complication until further afield.

The South Western main and Windsor lines are separated by a series of carriage sidings, Clapham being the principal centre in the London district.

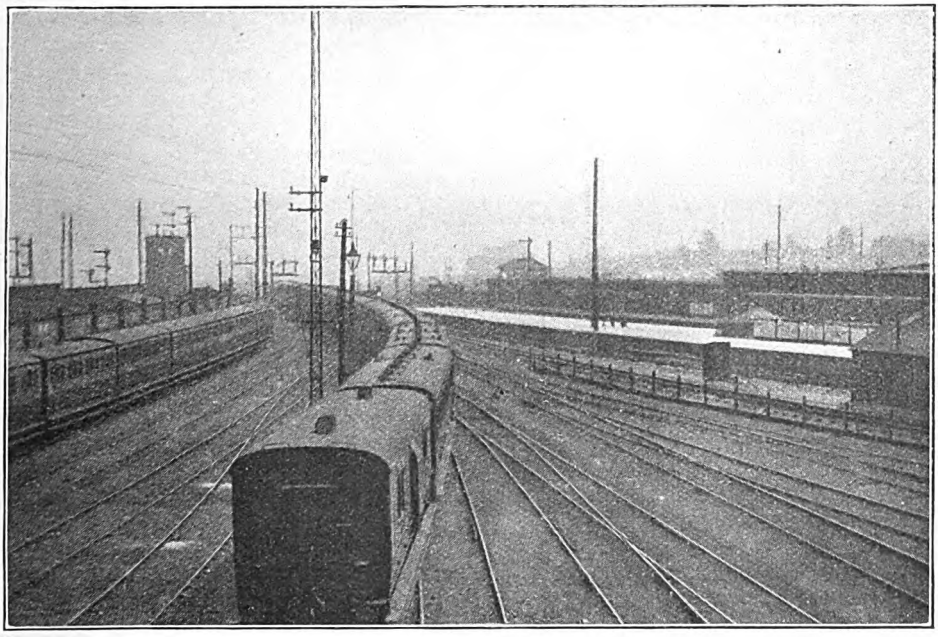

Photo.] [*R. W. Goodden.*

A VIEW IN THE CARRIAGE SIDINGS BETWEEN PLATFORMS Nos. 3 AND 4.

and in the station they diverge to the respective sections, one constituting the Windsor lines and the other the main lines of the London & South Western Railway. The third is the four-track main line of the London, Brighton & South Coast Railway from Victoria. In addition, there is a direct connection from the West London Extension Railway to the South Western side at No. 1 platform, with a connection also by means of a section of the South Eastern & Chatham Railway with the maze of lines and junctions in the Longhedge and Battersea districts; while on the Brighton side

Some of these roads extend, indeed, some distance Londonwards, so that the view looking towards town includes about 25 parallel tracks. To the south these sidings spread out fanwise in the angle between the South Western main and Windsor lines to form about 50 sidings, with a carriage repairing shop, where necessary attention is given. The London & South Western royal train is kept in this building.

There are also six goods sidings beyond No. 1, parallel with the Windsor lines, while No. 4 up loop gives access to a milk platform and loading dock. From

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these brief particulars some idea of the geography, magnitude and extent of this famous station will be obtained; but before discussing its lay-out in detail some reference may be made to road access and platform intercommunication.

There are four entrances to the station, but those principally used are the most insignificant, consisting of the well-known "tunnel," or subway, which extends the whole width of the station. On the Brighton side this is reached by a passage-way from the main road, now developed into a "parade" of good shops, but somewhat of the character of a slum court not so many years ago. At the other end the "tunnel" opens into a spacious booking hall for South Western traffic, and this is reached from the main road by means of a station yard paralleling the station, and partially covered by girder work supported on pillars to carry the outer line and half of No. 1 platform. It is, however, the Brighton end of the "tunnel" which is most favoured, and the busiest booking offices are the somewhat insignificant ones in the tunnel, one Brighton and one South Western.

The more dignified approaches are on the high level, both connecting with St. John's Hill Road, which is on a steep gradient, so reaching the necessary height to give direct road access to the respective cab yards. The Brighton booking hall, with its cab approach, is quite a distinctive building, erected not many years ago. It connects with a covered overbridge, replacing the old open footbridge, spanning the whole of the station. In view of the dual and distinctive ownership of the station, this covered way is discreetly divided intermediately to separate the streams of passengers passing to Brighton or South Western platforms, one side leading only to platforms 12 to 7 inclusive, while the other passes the interchange parcels office and continues across the remainder of the station to South Western platforms. Below the Brighton booking office is a large parcels office, with a low-level courtyard, which also provides direct road access to a milk dock leading directly to No. 12 platform, where Brighton milk traffic is usually dealt with.

The South Western entrance on St. John's Hill Road is a little further south. Alongside is an old house, formerly used for the District Traffic Superintendent's

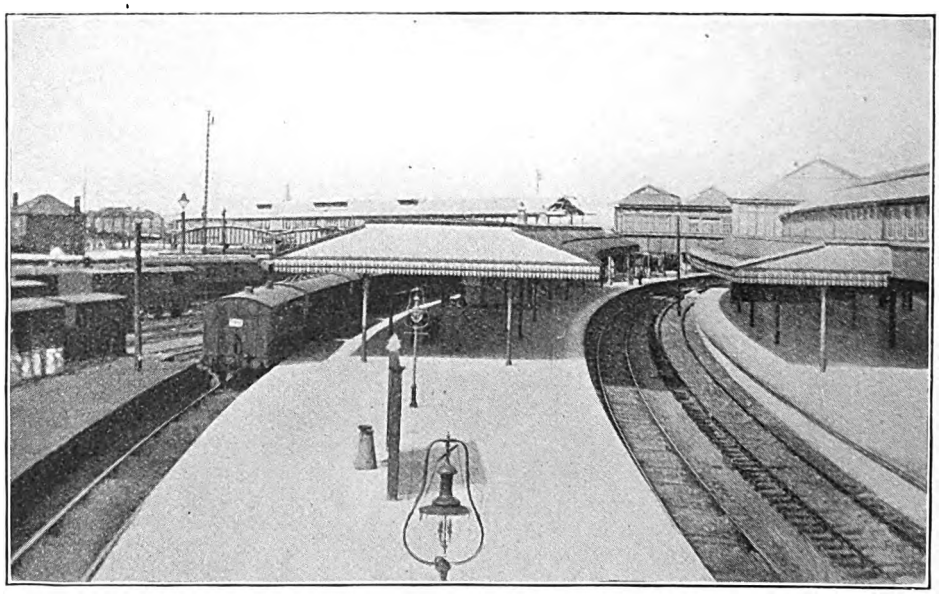

Photo.] [*R. W. Goodden.*

PLATFORM No. 4, SHOWING UP RELIEF LOOP AND MILK DOCK.

Photographed before conductor rails had been laid.

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office, but now serving as a residence for the South Western Station Superintendent, in view of the erection of new offices across the road for the former purpose. At this entrance is a covered cab yard, and access is given to a luggage cartage yard and a milk yard, connecting with the South Western milk dock below, hydraulic lifts being provided for communicating with the platforms below. There is, however, no booking hall here, and passengers have to traverse a covered passage leading to the covered way before mentioned as spanning the station, the booking offices being provided at the point of connection, thus serving for either way of approach. The exchange parcels office is also located near here.

It will be seen that although there are four means of access to the station, they are all in effect concentrated upon either the tunnel or the overhead covered way. The former is most used, and it is provided with suitable train indicators, that for the Brighton section being of the now well-known Benn & Cronin built-up changeable type, setting forth times for the various routes or stations.

It will now be convenient to deal with the various platforms and their traffic. No. 1 accommodates mainly the South Western motor trains which run between Clapham Junction and Addison Road; but in pre-war days there were also trains from Ludgate Hill (both London and South Western and South Eastern and Chatham), together with horse-box, milk and other specials from and to the Great Northern and Midland Railways. In fact, though many of the unusual publicly-booked trains which at one time reached Clapham Junction have temporarily, if not finally, disappeared, there is a great deal of interchange traffic between various railways dealt with at this platform, and during the war it was often a very busy part of the station. Between No. 1 and No. 2 is a middle road, and we then come to the first of the continuous traffic islands. This is No. 2, served by the up Windsor local and through lines, both carrying trains for Waterloo from Hounslow, Wimbledon Park, Richmond, Twickenham (and the Kingston roundabout route, also from Shepperton on Sundays and occasionally on weekdays), and from Staines, Windsor, Reading, &c. No. 3 serves the corresponding Windsor down local and through lines. Then come all the carriage sidings before mentioned. No. 4 serves main line up local and loop lines. The former is the usual up slow line, while the latter forms a loop to it, where trains can detach vehicles, or remain for a time if required without blocking other traffic on the up slow line. Thus during active hostilities, and to a lesser extent still, it was generally employed for unloading trains of wounded soldiers and sailors brought to various hospitals in the district. It also gives direct access to the milk dock, so that most of the numerous milk trains run by the South Western use this line for arrival. The other face serves up trains from main line and suburban routes via Wimbledon and Earlsfield. At the end, under the covered way from St. John's Hill Road, is a substation for the electric system.

No. 5 is the South Western main line island, one face up, the other down. Upon it are provided refreshment rooms, waiting rooms, station superintendent's offices, &c. No. 6 serves the South Western down local lines, but is reckoned as single-sided, its other face constituting No. 7, the up main line for Brighton trains. Nos. 8 and 9 are respectively the Brighton down main and up local lines, while No. 10 is the Brighton down local line for the numerous suburban routes operated by that company. Refreshment rooms are provided on platforms 8–9 and 10–11, while the stationmaster's office is on No. 8. The other face of No. 10 platform is the West London Extension up line No. 11, while No. 12 is the corresponding down line. Here most of the ordinary trains are locals from and to Addison Road, reversing in the station, while a few through London and North Western Railway trains from Willesden Junction to Croydon were dealt with until the service was withdrawn during the war period; but there are numerous goods and milk trains, some of the former working through, while in normal services there were various specials, such as the "Sunny South" through express from the London and North Western Railway to Brighton and Eastbourne, the short-lived Paddington-Brighton express, and other special trains not publicly booked. During the war

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period these became even more numerous, though unfortunately of an essentially different character. Other special traffic dealt with here includes Great Western Railway milk trains (two are dealt with regularly each day), theatrical specials and the like.

A remarkable feature of traffic at Clapham Junction is the large proportion of electric trains now running. In fact, all 12 of the through lines, together with No. 4 up loop, are equipped for electric traction, and it is quite possible for 12 daily; but with the development of electric traction, especially on the South Western side, as further Brighton development on similar lines is delayed to a considerable degree owing to war causes, these totals have grown very considerably. It is estimated now that about 1,600 trains call at or pass Clapham Junction on the South Western lines alone, while the Brighton adds between seven and eight hundred more. A good proportion of trains on both systems pass without calling, including both electric and steam

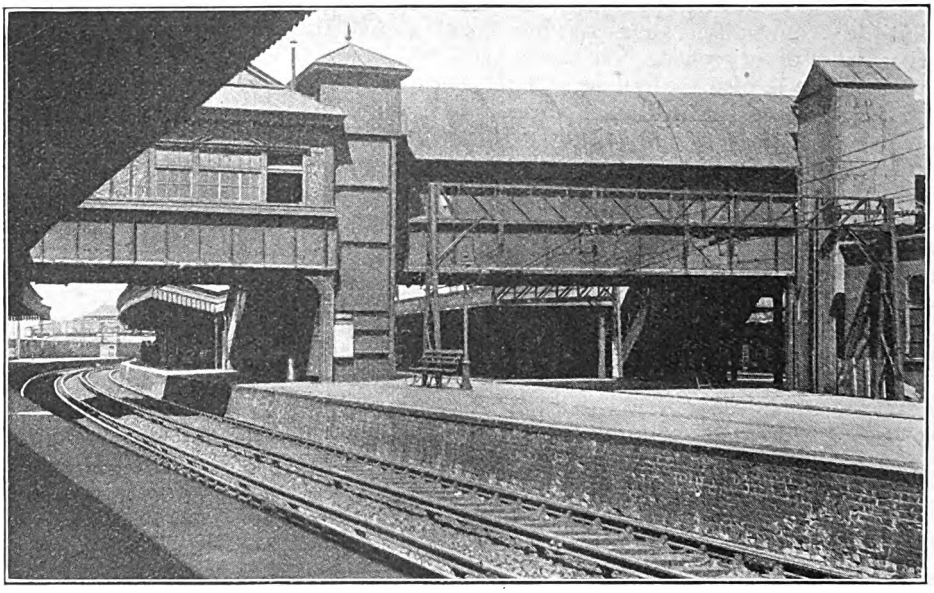

Photo.] [*J. F. Gairns.*

Nos. 6 (L. & S.W.R. DOWN SLOW) AND 7 (L.B. & S.C.R. UP FAST) PLATFORMS WITH Nos. 8—9 BEYOND.

Including part of covered way and lift towers, and showing conductor rails and overhead conductor equipments of the respective railways. Taken from No. 5.

electric trains to be in or approaching the station simultaneously without interfering with one another, though this can hardly occur yet, except under very special circumstances, if only because of the fact that the Brighton main lines, though equipped, are very rarely used by electric trains. This will, however, occur as the delayed equipment of further suburban lines is completed; but the possibility, whether actually realised or not, renders Clapham Junction unique in still another way.

Even in steam days Clapham Junction dealt with enormous numbers of trains

services; but in any case there is a heavy strain upon the signalling, and a considerable staff is necessarily required.

As the station is essentially and distinctively dual in ownership and operation, signalling and staff require to be considered in two sections. On the South Western side signalling is now of the British Pneumatic Railway Signal Company's low-pressure pneumatic type, with electric features, and semi-automatic for through running. Six power cabins come under the control of the Clapham Junction Station Superintendent. Approach from Waterloo is controlled first by West

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London Junction box. This has 37 levers, and besides through traffic controls access to the carriage sidings, also towards Addison Road, though this route is not greatly used now. In the carriage sidings is a Sidings box of 8 levers, but this is manual, though working in association with the Junction box mentioned. The main cabin is the East Box, spanning the Windsor lines at the London end of the station, but controlling all South Western tracks. This has 85 levers. The West Box (34 levers) controls the western end of the Windsor portion of the station, together with the goods sidings there, while the South Box (10 levers) deals with main line traffic towards Earlsfield. There is also the Cutting Box, about midway between Clapham Junction and Earlsfield. This has 12 levers and is power operated, but connects with the manual system beyond. These together employ 25 signalmen, with 5 boys attached to the East Box.

Brighton signalling is manual, with four cabins under the control of the Clapham Junction stationmaster. The largest is the North Box, controlling the London end of the station. This has 84 levers. At the other end, just beyond the road bridge carrying St. John's Hill Road over the station, is the South Box, 38 levers. Towards London, Poupart's Junction Box (35 levers) is concerned, while in the other direction is New Wandsworth Cabin (50 levers).

In THE RAILWAY MAGAZINE, August, 1911, Mr. W. E. Edwards described the signalling of the Brighton section of the station in detail. There are several interesting combinations of signals, but they are largely in distinct groups, placed as most convenient for traffic working and sighting. In combination with the structures carrying the overhead conductors for current supply many of the views obtainable are distinctive. On the platform serving lines 8 and 9 is a switch cabin, with necessary switches, whereby current can be cut off from any desired section of the line if required to meet an emergency.

Ordinary passenger traffic in both sections is essentially of a suburban character, and there is a large residential traffic provided by the populous district in which the station is located. There are also a number of industrial undertakings,

Photo.] [*J. F. Gairns.*

LONDON, BRIGHTON & SOUTH COAST RAILWAY BOOKING OFFICE AND STATION YARD.

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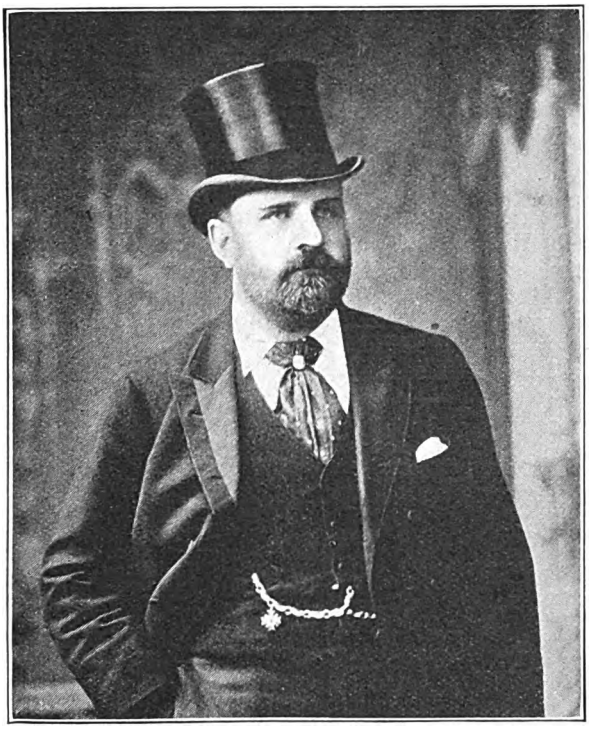

MR. R. W. GOODDEN,
Station Superintendent, Clapham Junction,
London & South Western Railway.

large business premises, &c., many of whose employees travel to and from the station daily as season-ticket holders.

Main line traffic is, however, by no means a secondary factor, and either as interchange from or to interconnecting routes, or originating in the district, or from the numerous tramway and omnibus routes passing the station, there is a heavy traffic in passengers joining or alighting from main line trains of both railways which stop at Clapham Junction. Milk traffic is also very heavy. Over 500 churns are exchanged daily between the two railways, full ones arriving from London & South Western milk-producing districts for transfer to London, Brighton & South Coast Railway or other routes connecting at Clapham Junction, involving corresponding arrangements for returning empties. There are also two daily milk trains from the Great Western Railway to the Brighton side of the station. In the South Western section milk traffic is a still greater factor, in that the railway serves a wide milk-producing area. In the aggregate, and not including milk transferred to the Brighton line and in other directions in through vans, about 2,600 churns are dealt with daily, mostly for use in the district, and arriving from the West of England stations beyond Yeovil and off the Somerset & Dorset Joint Railway.

Both railways have many important racing centres, so that the transfer of racehorses in through horseboxes is a large factor. There is also the considerable Sunday theatrical traffic, with through carriages and through vans for scenery, &c., involved by the widespread weekly changes characteristic of touring company operation. Exchange of vehicles between the two systems is usually made *via* the transfer sidings north of the station and between the respective main lines.

To provide intercommunication between the overhead covered ways, road connections, and the platforms, nine hydraulic lifts are employed in the South Western section, while in the Brighton station three electric lifts are installed.

At the Windsor line end of the "tunnel" access is given to a shooting gallery provided for staff purposes.

In steam days Clapham Junction was characterised by train totals unparalleled elsewhere; but the present-day situation is a striking example of the development which is brought about by electrification. The Brighton system of electric lines is still incomplete, and for lack of equipment it is not yet possible to operate more routes than were equipped when war broke out. Yet, even with the limited routes available, traffic has developed enormously as a result of electrification, and this augurs still greater developments when other routes can be taken in hand. It is, however, interesting to note that since electrification suburban traffic has nearly doubled in volume. Recent statistics for a day of 20 hours gave the following figures:—Number of stopping trains, 353; number of single tickets issued, 3,091;

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number of return tickets issued, 4,373; number of tickets collected, 7,693; number of platform tickets issued, 100; number of season-ticket journeys using the station, 5,234.

On the South Western side the different conditions obtaining have placed the company in a more favourable situation for proceeding under war conditions, with the result that, although the electrification scheme is still incomplete, no fewer than five to-and-fro and two "roundabout" routes are operated electrically. The combined result is that Clapham Junction is probably unique for electrically-worked services, as well as for steam traffic. As a centre for main line traffic it gives access to every part of the south, from Hastings in the east to Plymouth in the west; while easy connections *via* the West London Extension Railway and Addison Road give convenient communication with the whole of the London & North Western and Great Western systems. On the respective main lines serving Clapham Junction directly, despite non-stop expresses which give it the go-by, there is a good array of expresses and semi-fasts calling there, so that dwellers in the district and travellers from local stations adjacent are well provided for.

Parcels and luggage figure heavily in the work of the station, while milk has already been mentioned. Local firms cause consignments of considerable magnitude to be dealt with, while the district is so populous that, apart from interchange, business done is heavy. In the Brighton station about 7,500 parcels are dealt with monthly, and about 10,000 churns of milk are handled.

Mr. R. W. Goodden is in charge of the London & South Western portion of the station as Station Superintendent, and has held the position for nearly 16 years, having been appointed in 1903. He has a long record of service, having joined at Salisbury in 1871. He then went to Shepperton and Hounslow, and was next transferred to the Waterloo booking office. In due course he was employed in the booking office at Addison Road, soon after proceeding to Putney. In 1889 he obtained his first stationmastership (on the opening of East Putney station). In 1894 he became stationmaster at Barnes; in 1896 he was placed in charge at Staines Junction. In 1902 he went to Winchester; and in 1903 he came to Clapham Junction as Station Superintendent. In his earlier years Mr. Goodden was well known in connection with aquatic sports, more particularly when associated with riverside stations; but it is as a photographer that he is best known. Attaining professional status, he has been responsible for much semi-official photography, in addition to the more advanced branches of portrait and artistic photography. Two of Mr. Goodden's photographs are reproduced with this article.

The London & South Western male staff attached to Clapham Junction includes the following:—12 booking, parcels and other clerks; 4 station inspectors;

MR. E. GARDNER,

Stationmaster, Clapham Junction, London, Brighton & South Coast Railway.

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3 yard inspectors; 18 collectors; 4 head porters; 5 parcel porters; 30 porters; 4 messengers; 25 signalmen; 5 signal lads; 5 ground signalmen; 6 head shunters; 5 assistant shunters; 21 shunters; 5 couplers; 2 transfer shunters; 3 carmen; 3 van lads; 2 guards; 1 office porter. The female staff comprises 9 clerks and collectors; 1 transfer porter; 4 porters, and 3 waiting-room attendants. There are also 10 supernumerary porters, together with the carriage-cleaning and repairing staff, which does not come under Mr. Goodden's control.

Mr. E. Gardner, stationmaster of the Brighton station, joined the service in 1874 at Crystal Palace station, and was employed as booking clerk at Sydenham, Forest Hill, Norwood Junction, East Croydon (1879–1891), then obtaining his first appointment as stationmaster, at Norbury. He was then transferred to Marden Park (now Woldingham), afterwards being promoted successively to Honor Oak Park, Denmark Hill, Battersea Park, and West Croydon. He came to Clapham Junction about eight years ago.

Under his charge are:—13 signalmen, 6 signal lads, 2 inspectors, 2 head porters, 16 station porters, 3 parcel porters, 1 transfer porter, 1 chief clerk, 2 telegraph clerks, 9 booking clerks, 5 parcels clerks, 15 ticket collectors, and 3 shunters.

Both stationmasters are highly esteemed by their respective staffs, and relations between them as representing the two owning companies are entirely satisfactory, while among the general public using the station both gentlemen are deservedly popular.

In conclusion, the writer may express his indebtedness to Mr. Goodden and to Mr. Gardner and to officers of the respective companies for information and facilities utilised for the compilation of this article.

FOUR-CYLINDER COMPOUND 4-4-0 ENGINE REBUILT AS TWO-CYLINDER SIMPLE: LONDON & NORTH WESTERN RAILWAY.

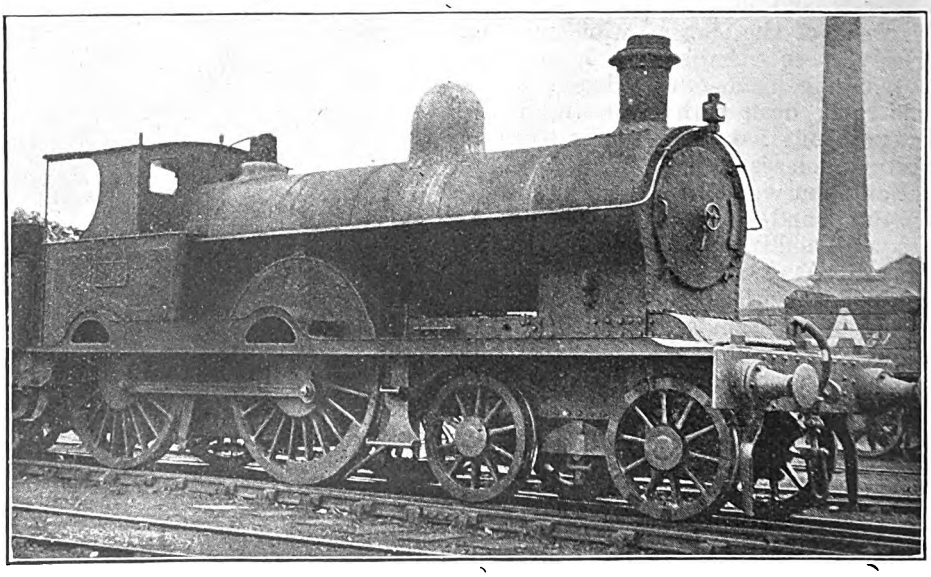

Photo.] 4-4-0 No. 1918 "RENOWN" AT PATRICROFT SHEDS. [*P. F. Cooke.*

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The Alexandra (Newport and South Wales) Docks and Railway.

By H. L. HOPWOOD.

IN the September, 1918, RAILWAY MAGAZINE there appeared an account of the Alexandra Docks at Newport, indicating the vast development of recent years which has made Newport one of the greatest and most efficient ports in the Bristol Channel, the Alexandra Docks and Railway Company now owning the largest single dock in the world and the largest lock entrance.

In order to trace the early history of the undertaking we must go back to the year 1865, when the Alexandra (Newport) Dock Company was created for the purpose of making docks and railways in the town of Newport. Construction began on May 28, 1868, but progress was somewhat slow.

GLYNTAFF CUTTING IN WINTER.

Although the enormous dock estate forms by far the greater part of the undertaking of the Alexandra (Newport and South Wales) Docks and Railway, its railway connections are extremely important, not only as feeders to the docks, but also as protecting and securing the dock interest under the keen competition of the docks and railway systems of South Wales.

We now supplement the information in regard to the docks by a description of the company's railway system, running powers, and working arrangements. The two latter, apart from their commercial and strategic value, are—like Sam Weller's knowledge of London—" extensive and peculiar."

and it was not until April 10, 1875, that the North Dock and Railway were completed and opened. The railway was then merely a connecting link between the dock and the Monmouthshire (Western Valleys) and Great Western Railways. The present title of the company was adopted in 1882, and two years later the undertaking known as the Newport Dock Company was acquired.

In the meantime, there was formed—by Acts of 1878 and 1883—a railway which was to play an important part in the development of the Alexandra Dock Company. This was the Pontypridd,

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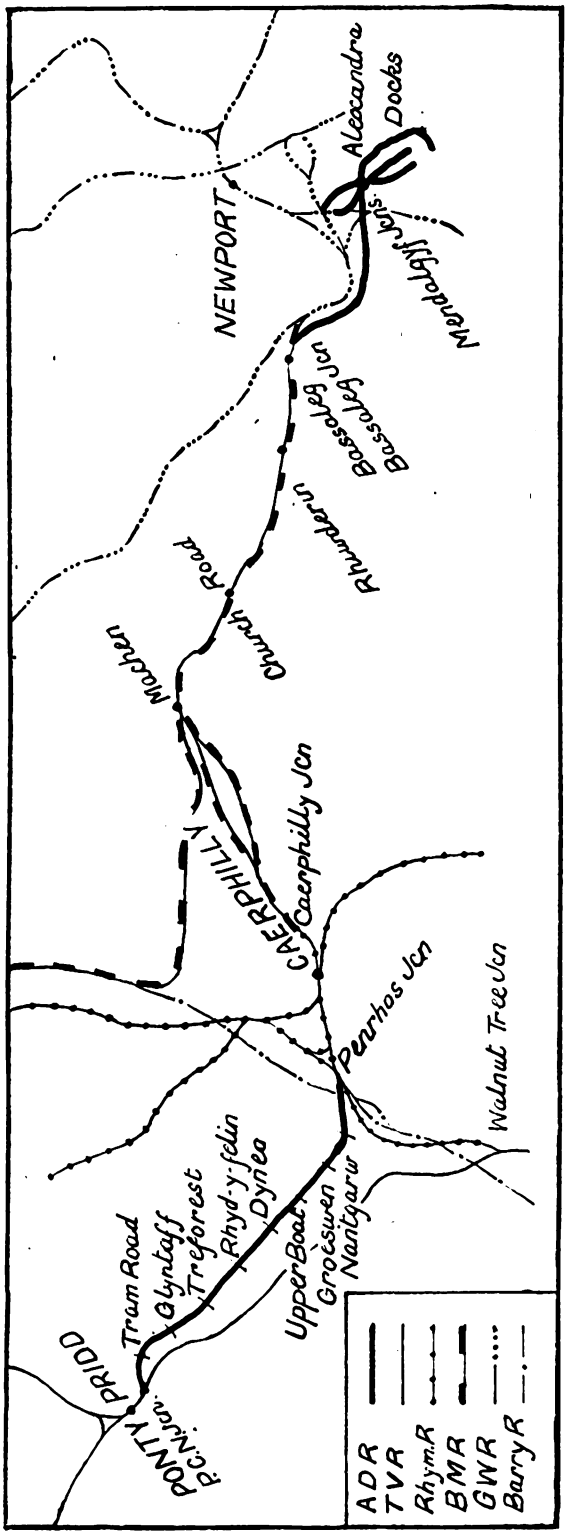

Caerphilly and Newport Railway, projected for the purpose of bringing coal from the Rhondda and Aberdare Valleys for shipment at Newport. As constructed, this railway was in two sections, viz., from Pontypridd to Caerphilly, and from Bassaleg to Mendalgyf West Junction with the Alexandra Dock line at Newport. At Pontypridd, the railway commenced by a junction with the Taff Vale Railway south of the station. Between Caerphilly and Bassaleg there was already a direct line owned by two railways—Rhymney and Brecon and Merthyr—and from these companies were obtained the necessary powers for running over their systems.

For part of the distance the Bassaleg-Alexandra Docks section parallels the Great Western four-track Western Valleys line, so that there are six lines running down the valley from Bassaleg towards Newport, a combination which makes a very picturesque railway scene, especially where the lines curve round the hillside and run through Tredegar Park.

The Pontypridd, Caerphilly and Newport Railway was opened from Pontypridd to Caerphilly on July 25, 1884, and from Bassaleg to Alexandra Docks in April, 1886. The railway thus afforded direct communication between the coalfields of the Rhondda and Aberdare Valleys and Newport, and was the means of developing, to a considerable degree, the traffic at Alexandra Docks.

During its independent existence, the railway occupied a very curious position. Owning no engines itself, mineral and passenger traffics were worked by two different foreign companies. For the first few years only mineral trains were run, and, under agreement, the Taff Vale Railway supplied the necessary engine power.

A service of passenger trains between the Taff Vale station at Pontypridd and the Great Western station at High Street,

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Newport, commenced running on December 28, 1887, and for this purpose engines and coaches were supplied by the Alexandra Docks and Railway. Between Bassaleg Junction and Newport, these trains took the Great Western (Western Valleys) route. The distance between Pontypridd and Newport was 18 miles 29 chains, and this mileage was divided among five railways in the following proportions:—

Railway.	Between what points.	Distance M.	C.
T. V.	Pontypridd Station and P.C. & N. Junction	0	19
P.C. & N.	P.C. & N. Junction and Penrhos Junction	5	12
Rhymney	Penrhos Junction and Caerphilly Junction	1	51
B. & M.	Caerphilly Junction and Bassaleg Junction	8	27
G.W.	Bassaleg Junction and Newport High Street	3	0
	Total	18	29

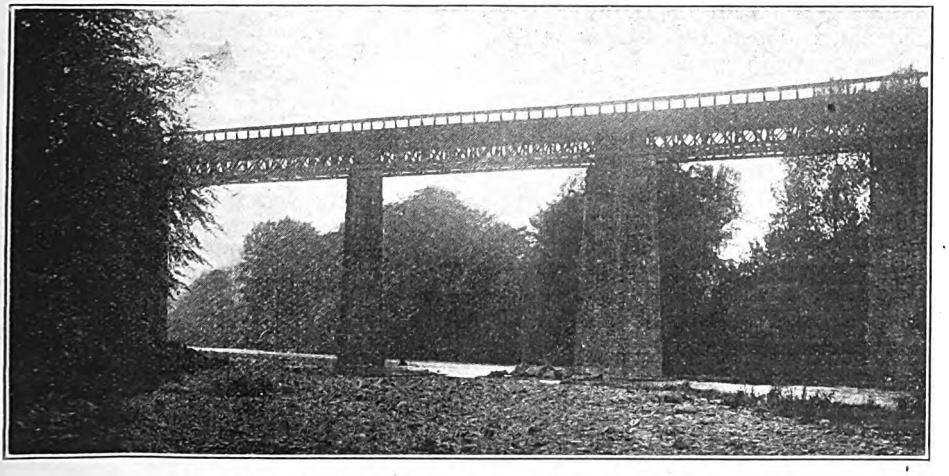
Except, perhaps, in the London district, we cannot call to mind another instance in which so much foreign working is involved in such a comparatively short distance.

Coal trains from Pontypridd followed the above route as far as Bassaleg, where they were transferred to their own line upon its opening in 1886. This section extended for 2 miles 25 chains to Mendalgyf West Junction, at which point the line of the original Alexandra Dock Company was joined.

Until 1891 the Brecon and Merthyr branch from Caerphilly to Machen was only a single track, and approaching Machen station there was a steep ascent at 1 in 39 for nearly a mile. This gradient proved a serious obstacle in the path of loaded coal trains going towards Newport, and to overcome the difficulty the Pontypridd Company projected an additional line a little way north of the old one. By this route the steepest grade against the load was 1 in 200.

The Act authorising this "Machen Loop," as it is called, was dated August 8, 1887, and the line was opened September 14, 1891. The circumstances under which it was transferred to the Brecon and Merthyr Railway were related in a recent article dealing with that railway, but it may be as well to repeat the information there given, viz., that the line became part of the Brecon and Merthyr system in consideration of the Pontypridd Railway receiving in perpetuity a moiety of the earnings of the Machen-Caerphilly branch. The Machen Loop now forms the down track of the Caerphilly branch, and accommodates traffic *to* Newport, whilst the older line is used by up trains from that place.

The Pontypridd, Caerphilly and Newport Railway was absorbed by the Alexandra Docks and Railway in 1897, and by this amalgamation the latter Company added 7½ miles to its system which now comprises 9¼ miles of running lines and 108 miles of sidings. Foreign lines are worked over to the extent of 13 miles, and the company possesses (but does not exercise) running powers over the Brecon and Merthyr Railway between Machen



BRIDGE OVER RIVER TAFF AT PONTYPRIDD.

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and Rhymney, and over the Rhymney Railway between Penrhos Junction and Cardiff.

It has already been said that since its inauguration, the Pontypridd - Newport passenger service had been worked by Alexandra engines, and this arrangement continued for some time after the amalgamation of 1897 ; but commencing January 1, 1899, the working was transferred to the Great Western Railway— who provided four trains each way on weekdays only, a service similar to that previously run. The position of affairs in 1899, and until 1904, was, therefore, that passenger trains were worked by the Great Western Railway and mineral trains by the Taff Vale Railway.

In 1904 the Alexandra Company started a supplementary rail motor service of its own between a new station at Pontypridd (Tram Road) and Caerphilly. It should be noted that the motor did not serve the Taff Vale station at the first-named place. Seven halts were opened between Pontypridd and Caerphilly, but there was only a name-board and lamp at each ; no platforms being provided. The rail motor was built by the Glasgow Railway Engineering Company of Govan in 1904, and another by the same firm was added in the following year. These cars were driven by engines having locomotive type boilers pressed to 160 lb. The cylinders were 9 by 14 in., and drove one pair of the engine bogie wheels, the latter being 3 ft. in diameter.

Subsequently, the motors were withdrawn and replaced by a regular train. This is now worked by engine No. 14, a 0-4-2 side tank. The last time we travelled on the line, the train consisted of a Great Western four-wheeler and an Alexandra bogie coach. The latter used to belong to Messrs. Barnum and Bailey and may be best described as an English edition of an American parlour car, the exterior being very like that of a Pullman car. When Messrs. Barnum and Bailey's "Greatest Show on Earth" visited Great Britain in 1898, Messrs. Renshaw, of Stoke-on-Trent, built a special train for the provincial tour. This train comprised dining and sleeping cars for the staff, menagerie cars, flat-topped wagons, &c., all bogie stock, built on American lines, but modified in detail to suit English conditions. At the conclusion of the tour the vehicles were disposed of and several were acquired by the Alexandra Docks and Railway. It is one of the staff cars, suitably altered, which is now running between Pontypridd and Caerphilly.

A further change in working arrangements was made in May, 1906, when the Taff Vale Railway ceased to work mineral trains, and since that time the Alexandra Company has provided its own engines for the purpose, as between Pontypridd and Newport.

Commencing January 1, 1917, the Great Western service between Pontypridd and Newport was temporarily withdrawn, and in place of it the Alexandra train was extended to Machen in connection with Brecon and Merthyr trains to and from Newport. At the Pontypridd end, however, the train went no further than Tram Road station, which meant that through passengers to and from the Taff Vale line were obliged to walk between the two stations in the town.

Summarising the foregoing remarks, we find the following have been the working arrangements since the opening of the railway :—

1884.—P.C. & N.R. opened for mineral traffic and worked by T.V. R. engines.
1887.—Pontypridd-Newport passenger service inaugurated and worked by A.D. and R. engines.
1897.—P.C. & N.R. absorbed by A.D. & R.
1899.—G.W.R. takes over from A.D. & R. the working of passenger trains.
1904.—Pontypridd-Caerphilly motor service inaugurated and worked by A.D. & R.
1906.—T.V.R. ceases to work mineral trains and A.D. & R. provides its own engines as between Pontypridd and Newport.
1917.—G.W.R. temporarily withdraws Pontypridd-Newport passenger service and A.D. & R. extends its Pontypridd-Caerphilly service to Machen in connection with Newport trains of B. & M.R.

During the war the Pontypridd section of railway was largely used as an alternative route for through trains of Admiralty coal. These trains passed via Pontypridd Junction, Penrhos Junction, Rhymney Railway, and Hengoed, thus avoiding the difficult gradient and the congestion at Quakers Yard.

Apart from the railway lines already constructed and in use, the company obtained powers in 1911 to construct a

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line to the Sirhowy Valley, connecting with the London and North Western Railway at Nine Mile Point, so as to give an additional and independent route to the large and rapidly-developing collieries in the Sirhowy Valley. In 1914 a further Bill was obtained for slight deviations from the original scheme, but owing to the war the construction of the new route has been held up.

The first engines acquired by the Alexandra Dock Company were six coupled saddle tanks, purchased from the London and North Western Railway.

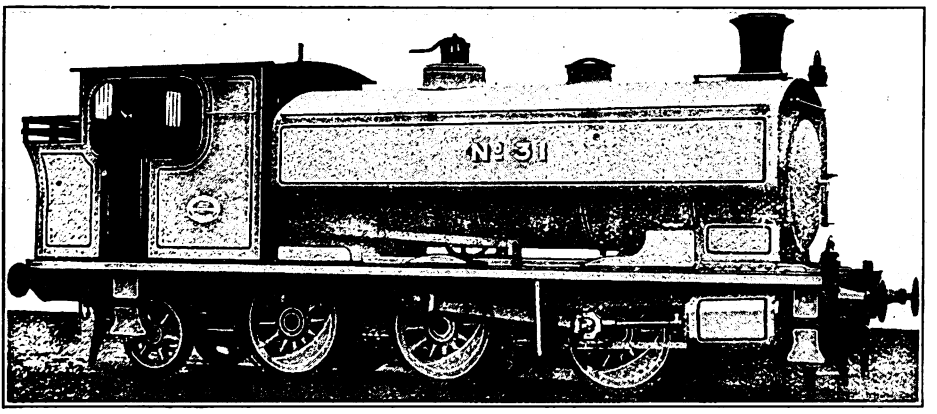
Among other engines were three 0-6-0 double-framed tank engines purchased from the London, Brighton and South Coast Railway. On that line they were at first numbered 228, 229, and 58, but were re-numbered 9, 10, and 14 respectively by the Alexandra Company. No. 10, *Caerphilly*, was the engine generally allocated to work the Pontypridd-Newport passenger service. No. 14 was the last survivor of these ex-Brighton railway engines, and was withdrawn from traffic in 1906.

According to latest information, there are now 35 tank engines in service, and these are classified as follows :—

Type.	Number.
0-6-0	19
2-6-2	7
0-6-4	3
0-6-2	3
0-4-2	1
0-4-0	2
Total ..	35

Details appear in the table on page 166, but some explanatory notes of these engines will be of interest.

The oldest engine running is No. 26, and its history is of unusual interest. It was originally built for the St. John's Wood section of the Metropolitan Railway. With cylinders then 20 by 24 in. and six coupled wheels, 4 ft. diam., it was found too large to deal economically with the trains it was designed to work, and was therefore laid aside until it was sold for use on the Sirhowy Railway. It was afterwards bought by its present owners, and during its long career has been re-boilered at least twice, and has also had new cylinders.



0-6-2 SADDLE TANK ENGINE, No. 31.
Built by Andrew Barclay & Co., Ltd., Kilmarnock.

In 1905 the locomotive stock was increased by ten engines, owing to the fact that the company would have shortly to provide power to work its own Pontypridd-Newport mineral trains, which hitherto had been hauled by Taff Vale engines. This arrangement took effect in May, 1906, as already mentioned. The engines in question came from the Mersey Railway, as that Company's locomotives were then in the market owing to conversion of the railway from steam to electric traction. These 10 engines comprised 7 2-6-2 tank engines with outside cylinders, 19½ by 26 in., and 3 0-6-4 tank engines with inside cylinders, 21 by 26 in. ; both lots having 4 ft. 7 in. wheels. When working on the Mersey Railway they had condensing gear, but this was removed when the engines were overhauled at Newport.

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LOCOMOTIVES OF THE ALEXANDRA DOCKS AND RAILWAY.

No.	Type.	Cylinders.	Wheels.	Makers.	Makers' No.	Remarks.
		inches.	ft. in.			
1	0-6-0	16 by 24*	4 0	R. Stephenson & Co. ..	2893	
2	0-6-0	16 by 24*	4 0	,, ,, ..	2894	
3	0-6-0	16 by 24*	4 0	,, ,, ..	2978	
4	0-6-0	16 by 24*	4 0	,, ,, ..	2979	
5	0-6-0	16 by 24*	4 0	,, ,, ..	3003	
6	2-6-2	18½ by 26†	4 7	Beyer Peacock & Co. ..	2866	ex Mersey Railway.
7	2-6-2	18½ by 26†	4 7	,, ,, ..	2865	
8	2-6-2	18½ by 26†	4 7	,, ,, ...	2869	
9	2-6-2	18½ by 26†	4 7	,, ,, ...	2867	
10	2-6-2	18½ by 26†	4 7	,, ,, ..	2868	
11	2-6-2	18½ by 26*	4 7	,, ,, ...	2870	
12	0-6-0	18 by 24*	4 0	Hawthorn Leslie & Co. ..	1977	
13	0-6-0	18 by 24*	4 0	,, ,, ..	1976	
14	0-4-2	16 by 24*	5 2	Great Western Railway ..	—	ex G.W.R. 1426.
15	0-6-0	18 by 24*	4 6	R. Stephenson & Co. ..	2555	
16	0-6-0	18 by 26*	4 6	Hawthorn Leslie & Co. ..	2146	
17	0-6-0	18 by 26*	4 6	,, ,, ..	2147	
18	0-6-0	14 by 20†	3 6	Peckett & Sons	465	
19	0-6-0	14 by 20†	3 6	,, ,, ..	450	
20	0-6-0	18½ by 24*	4 6	R. Stephenson & Co. ..	2814	
21	0-6-0	18½ by 24*	4 6	,, ,, ..	2815	
22	0-6-4	20 by 26*	4 7	Beyer Peacock & Co. ..	2603	ex MerseyRailway.
23	0-6-4	20 by 26*	4 7	,, ,, ..	2604	
24	0-6-4	20 by 26*	4 7	,, ,, ..	2602	
25	2-6-2	18½ by 26†	4 7	Kitson & Co.	3393	
26	0-6-0	18 by 24*	4 0	Worcester Eng. Co... ..	—	
27	0-6-0	17 by 26*	5 0	Great Western Railway ..	—	ex G.W.R. 1683.
28	0-6-0	17 by 26*	5 0	,, ,, ..	—	ex G.W.R. 1679.
29	0-6-2	18 by 26†	4 3	Barclay & Co.	1154	
30	0-6-2	18 by 26†	4 3	,, ,, ...	1155	
31	0-6-2	18 by 26†	4 3	,, ,, ...	1156	
32	0-6-0	16 by 24†	4 0	Avonside Eng. Co.	—	ex G.W.R. 1356.
33	0-6-0	16 by 24*	4 0	Great Western Railway ..	—	ex G.W.R. 998.

Also two 0-4-0 saddle tanks (not numbered) working in the Town Docks at Newport.

* Inside cylinders. † Outside cylinders.

Nos. 1 to 5, 12, 13, 15 to 21, 27 to 31, and 33 are saddle tanks.
Nos. 6 to 11, 14, 22 to 26, and 32 are side tanks.

At the same time cabs were fitted in place of the original weatherboards, and the cylinders of both classes were lined up 1 in. The former working pressure of 150 lb. has been increased by 10 lb., and in some cases new boilers have been provided. These engines are numbered 6 to 11 and 22 to 25.

In 1908 three further engines for main line service, Nos. 29 to 31, were supplied by Messrs. Andrew Barclay & Co., of Kilmarnock. These fine machines are 0-6-2 saddle tanks, having outside cylinders, and they form the most modern and powerful examples of the company's locomotive stock.

Following are the leading dimensions :—

Cylinders	18in. by 26 in.
Diameter of wheels—	
Coupled	4 ft. 3 in.
Trailing	3 ft.
Wheelbase—	
Rigid	12 ft. 6 in.
Total..	18 ft. 6 in.
Diameter of boiler	4 ft. 5 in.
Diameter of tubes (192) ..	1¾ in.
Heating surface—	
Tubes	1.052 sq. ft.
Fire-box	96 sq. ft.
Total	1.148 sq. ft.
Working pressure	160 lb.
Water capacity	1,200 gals.
Coal ,, ...	3 tons.
Weight in running order ..	53 tons.

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Five engines have been acquired from the Great Western Railway. Of these, the most recently purchased is No. 14, which was given the number formerly borne by the ex-Brighton Railway engine, scrapped in 1906. No. 14 is a 0-4-2 side tank used for the Pontypridd-Caerphilly passenger trains, as already mentioned. Another interesting ex-Great Western engine is No. 32, a 0-6-0 side tank with outside cylinders. It originated from the works of the Avonside Engine Company for service on the Severn and Wye Railway, and on that line was named *Will Scarlett*. The name was retained whilst the engine was in Great Western service, but it has been removed by its present owners. The other three ex-Great Western engines are of that company's standard 0-6-0 saddle tank type and bear numbers 27, 28 and 33. Remaining locomotives are 0-6-0 saddle tanks of various makers' standard designs.

A New South Wales Tank Engine.

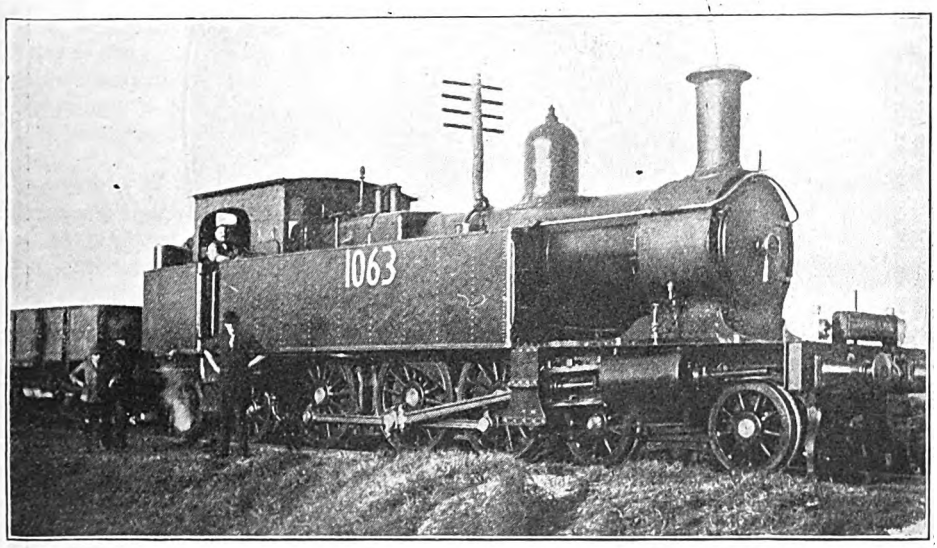

Photo.] 4-6-4 "S" CLASS TANK ENGINE, No. 1063. [*Gerald Shannon.*

A NOTEWORTHY tank engine of the New South Wales Government Railways, which works on the Sydney–Campbelltown (34 miles) local passenger service, daily, is 1,063. With short runs on the main suburban line the total mileage daily is 200. The heaviest load it has to draw is 200 tons, *i.e.*, 10 carriages empty (not with passengers as reckoned in England). An interesting feature, somewhat unusual to British readers, is the illuminated destination indicator above the buffer-beam.

This engine was turned into traffic on July 31, 1916, being built at Eveleigh Locomotive Workshops, Sydney, and is classified as an "S" class suburban engine, with 4-6-4 wheel arrangement. Up to February, 1919, it had completed 126,677 miles. It was withdrawn at the end of March, 1919, for general repairs. Previous to this it has only had slight attentions and running repairs.

The principal dimensions are :—

Cylinders	18½ in. diam. by 24 in. stroke.
Driving wheels	4 ft. 7 in. diam.
Heating surface	1,452½ sq. ft.
Grate area	24 sq. ft.
Boiler pressure	160 lb. per sq. in.
Total weight in working order	72 tons 1 cwt. 1 qr.
Total weight empty	57 tons 14 cwt. 3 qr.
Total length over buffers	40 ft. 4 in.

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GREAT WESTERN RAILWAY.

Elliott] [*& Fry.*

MR. CHARLES ALDINGTON, C.B.E.,

General Manager.

IN succession to the late Mr. Frank Potter, the directors of the Great Western Railway Company have designated Mr. Charles Aldington, C.B.E., to the General Managership. RAILWAY MAGAZINE readers who have followed Mr. Aldington's career are well aware of the appropriateness of the appointment. Until he took over the duties of Assistant General Manager in the spring of 1919 Mr. Aldington had been from January 1, 1910, the Superintendent of the Line. Although continuously in the service of the Great Western Railway since 1876, save for the three years 1899–1902, when he was Traffic Superintendent of the Central London (Electric) Railway. Mr. Aldington's railway knowledge is by no means local in character. The United States of America and Canada have been visited by him several times, and he has taken care to acquire and assimilate all that is worth while in American and Canadian railway business methods and traffic working. He has likewise travelled and studied transport problems and railway practice in France, Germany and Italy. Accomplished and capable to a degree, his nomination to the premier post in the Great Western Railway service should prove as satisfactory to the shareholders as it is popular with the staff throughout the length and breadth of this widespread system.

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Rolling-Stock Distribution on the Midland Railway.

DURING the war, extraordinary requisitions were made upon the railway companies for rolling-stock of all kinds, and now that hostilities have ended, the demands for transit facilities made by consignors in every part of the United Kingdom seems likely, if that be possible, to surpass them. With the revival of trade the movement of goods and mineral traffic is increasing daily, and a serious aspect of the wagon shortage is that relating to collieries which, in some cases, are working on short time for want of wagons.

Under these circumstances, it is exceedingly necessary to keep a strict account of the movements of wagons by means of what is known as a wagon distribution system.

The system of distribution adopted by the Midland Railway has been recognised for some time as a highly efficient one. It is placed under the supervision of the General Superintendent, Major J. H. Follows, C.B.E., and is conducted as part of the control system of traffic working. The distribution is highly centralised, being governed from Derby where the necessary machinery and appliances, incorporating a comprehensive system of private telephonic communication and wagon indicators, is established.

For control and wagon distribution purposes the Midland Railway is divided into 25 areas, varying in size according to traffic density. In each area there is a district control office, and this office is in telephonic communication with all stations, collieries and works sidings, and also the marshalling sidings in the area. The headquarters control office, situated at Derby, is connected by telephone with all the district control offices by means of four trunk telephone circuits as follows :—

North.	*South.*
Toton.	Kirkby.
Westhouses.	Nottingham.
Staveley.	Melton.
Masborough.	Peterborough.
Cudworth.	Wellingborough.
Leeds.	Luton.
Skipton.	London.
Carlisle.	Plaistow.

West.	*Manchester.*
Coalville.	Gowhole.
Burton.	Rowsley.
Leicester.	Derby.
Birmingham.	
Gloucester.	
Swansea.	

The whole of the offices on these circuits communicate with each other and, by means of a switchboard at headquarters, with any office on the other circuits. The attention of the headquarters control staff is called by means of differently-coloured lights in the shape of small bulbs fixed on standards on the control table; bell-ringing or other audible signals being avoided.

The forms in use are the following :—

Headquarters.

(1) 8 a.m. empty wagon summary.
(2) Special wagons ordered and supplied.
(3) Special wagons. Spare.
(4) Colliery, mine and quarry wagon supply statement.
(5) Locomotive empties required, supplied and loaded.
(6) 4 p.m. wagons, spare and required.

District Control Offices.

(7) 8 a.m. empty wagons on hand required and supplied.
(8) Special wagon orders summary.

Stations.

(9) Daily despatch of special wagons.

The principles which govern the distribution of stock are :—

(1) Knowledge of the stock required, date of loading, destination of the traffic, &c.
(2) Knowledge of the number of vehicles available to meet these requirements, and their position.
(3) Knowledge of facilities available to move the vehicles to the points at which they are required.
(4) Co-ordination of the foregoing in such manner as will produce the desired results, namely, an efficient and economic distribution.

The secret of success in a scheme of rolling-stock distribution must necessarily be a knowledge of the exact position, as regards the location of the stock at the

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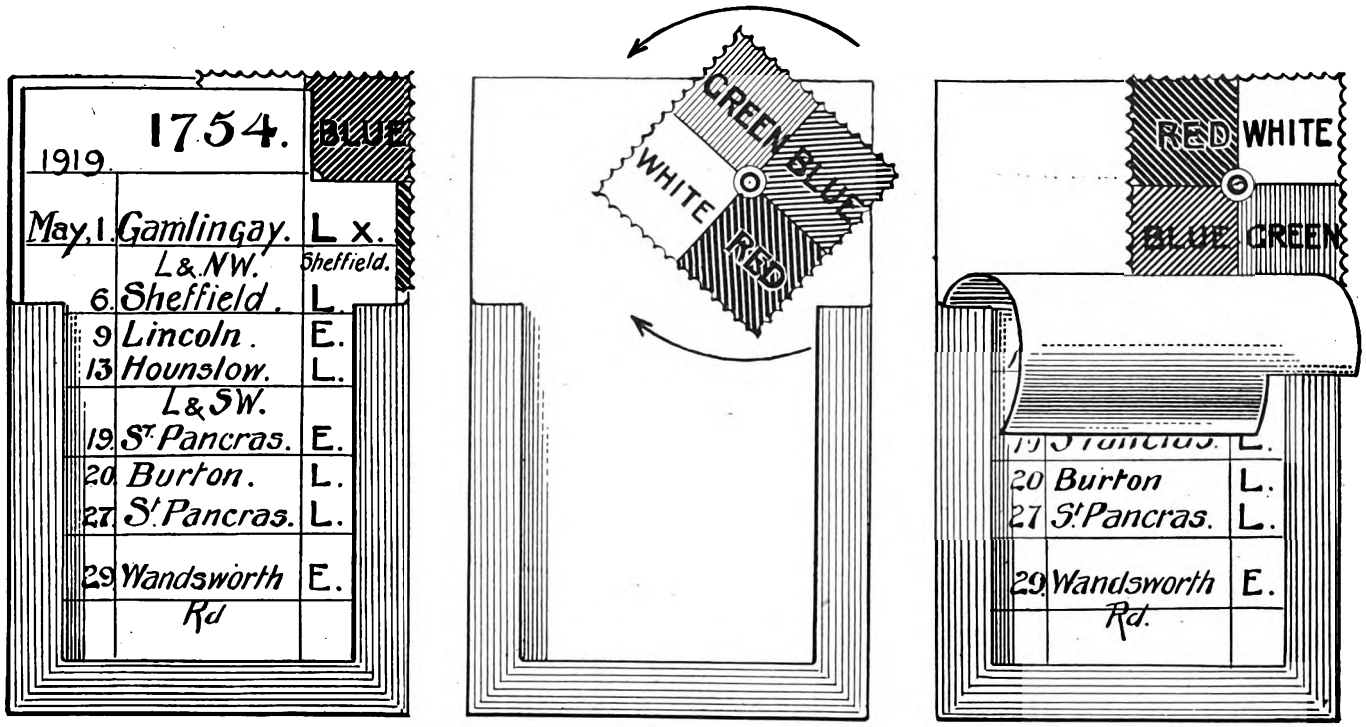

CARD SLIP HOLDER AND REVOLVING COLOURED INDICATOR USED ON THE MIDLAND RAILWAY FOR RECORDING DISTRIBUTION OF SPECIAL WAGONS.

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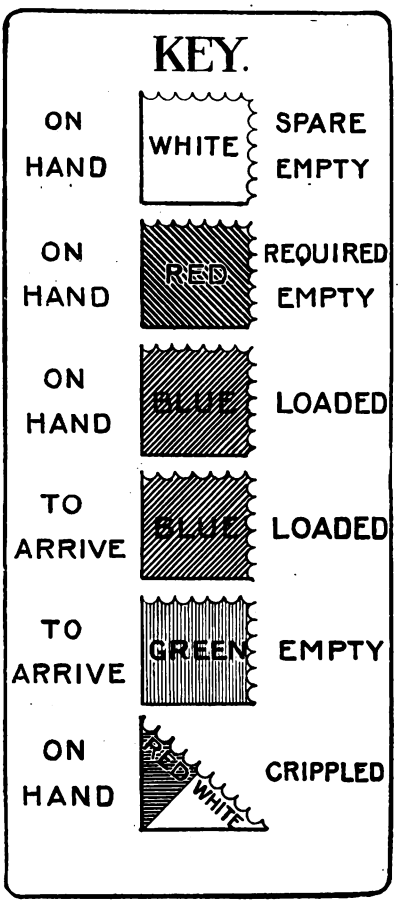
moment, and not as it may have been yesterday, and further, the application of facilities available at the time, or, if necessary, the creation of such facilities. The Midland Railway Company are the largest owners of railway wagons in this country. Their stock of 126,000 vehicles comprises no fewer than 105 different types of goods and mineral wagons, and each type is identified by a code letter or letters. These letters have not been chosen haphazard, but in accordance with a considered plan ; thus a final F indicates an 8-ton wagon, other notations being as follows :—H 10, K 12, M 15, N 18, O 20, R 25, S 30, X 35, Z 40 and Y 60 tons, and in distributing the wagons are referred to by code only. There are modifications in the system of distribution, and the different types are classified under the following heads :—

Ordinary wagons and vans (common user and non-common user).
Timber trucks, rail wagons and cattle wagons.
Specially constructed vehicles.
Empties for locomotive coal.
Passenger stock.

The general wagon position is reviewed twice daily, namely, at 8 a.m. and 4 p.m., when reports are received from all the various centres at the headquarters control at Derby, the necessary disposition being made immediately thereafter. Each morning at 8 o'clock the station and sidings report to the district control office the number of empty wagons on hand of every class, and the number required for loading on that day, taking into consideration the number of empty wagons that will be produced. This information is summarised in the district control office, and telephoned to headquarters, as intimated above. A time-table is in force which fixes the time when the information has to be given, and the details are taken from the 25 areas, by one assistant, in a space of 34 minutes. This may appear to constitute a highly formidable task, but, owing to the efficient and well-organised arrangements, it is in reality nothing of the kind, and the writer's investigations at Derby show that it is performed every day with smoothness and regularity.

By means of the reports from the district control office and the entry of the details on the form provided for the purpose, the wagon position for the day can be ascertained at a glance, and with the knowledge thus acquired the necessary steps are immediately taken to supply a deficiency at one point from a surplus at another, the train services being arranged at the same time. Similarly, it is possible, where necessary, to restrict the use of wagons in order to equalise any shortage.



KEY TO COLOUR SCHEME OF INDICATORS.

Requirements for timber trucks, rail and cattle wagons, and specially-constructed vehicles of all kinds, are telephoned in full detail to headquarters, particulars of the wagons supplied on the previous day being given at the same time. The orders for timber trucks, also rail and cattle wagons, are met from the surplus shown on the 8 a.m. wagon summary, orders for specially-constructed wagons, of which

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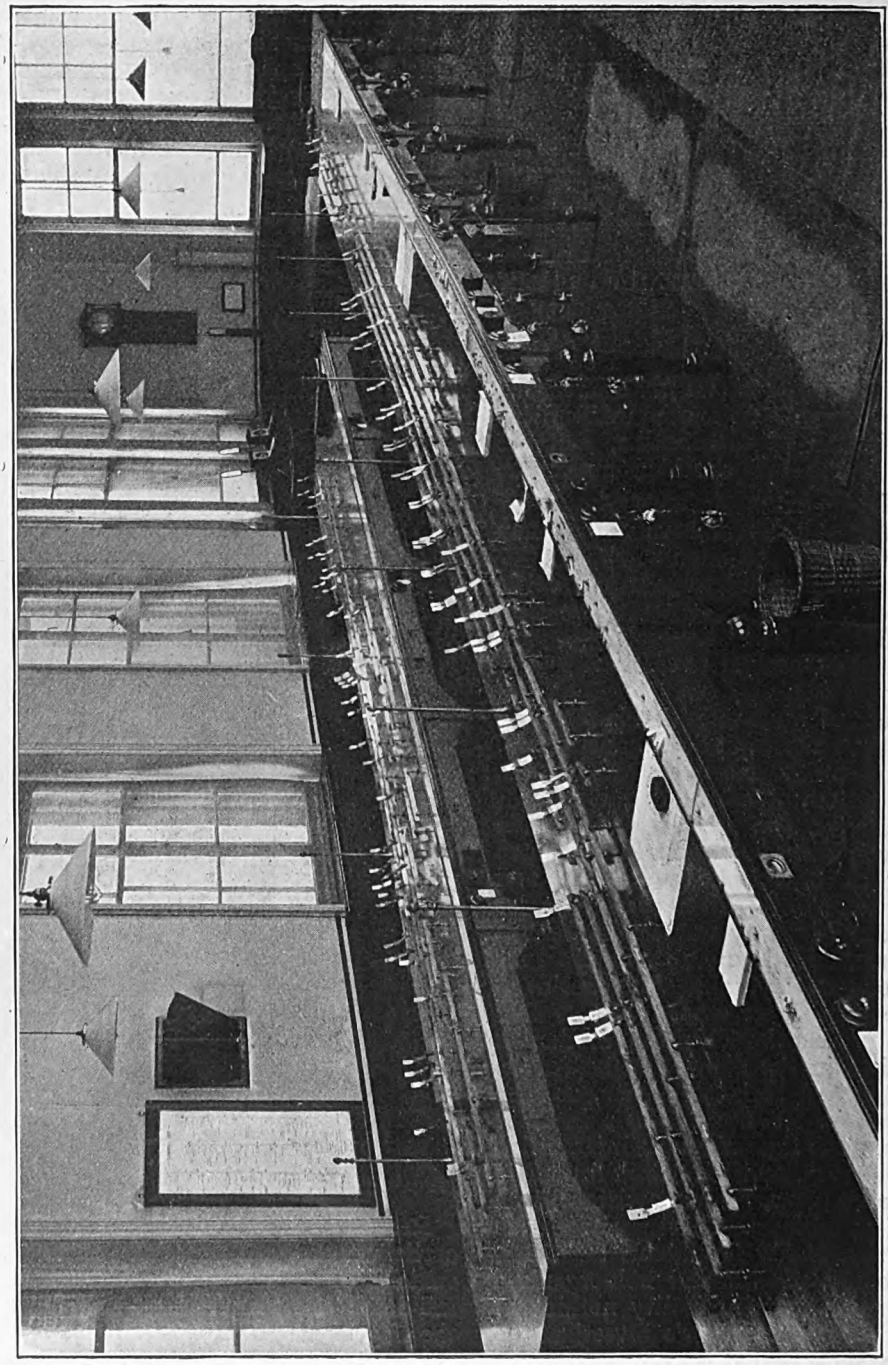

VIEW IN TRAIN CONTROL ROOM AT DERBY, SHOWING CONTROL TABLES AND TELEPHONES, MIDLAND RAILWAY.

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there are nearly 900, being met by consulting the wagon indicator. They show, by means of a revolving four-colour indicator, in conjunction with guide cards, where the wagon is, whether it is loaded or empty, spare or required, running empty or crippled, and so forth, the supplies of wagons being arranged with a minimum of empty mileage. The accompanying illustrations of the indicator show its construction with clearness, and how the location and condition of a wagon is indicated. It should here be stated that the use of the indicators is confined to the distribution of specially-constructed stock, as distinct from the other types. The ordinary goods and mineral stock is dealt with on forms.

The indicators are placed in separate receptacles, in a specially-constructed cabinet, arranged in tiers upon the sloping cabinet, and arranged in accordance with the character of the wagons themselves, and also in respect of different areas, not only on the Midland Railway itself, but working through on to other companies' lines. We have selected for the purpose of illustration a typical indicator, and a reproduction of this appears on page 170. The indicator consists, as shown, of a cardboard slide, on the grooves on either side of which is placed a paper slip bearing the number of the wagon. On this paper slip spaces are provided in three separate columns, the dates on which the various movements of the particular wagon were effected being shown in the left-hand column, points to which the wagon was moved in the centre column, and the fact of it being either loaded or empty in the right-hand column. Attached to the cardboard slide at the uppermost right-hand corner is the four-colour indicator proper, this being made to revolve on a fixed central point so that any one of the four coloured sections can be brought opposite the cutaway portion of the paper slip for the purpose of showing, in accordance with the pre-arranged plan, the description of the wagon movement, whether it is loaded or empty, on hand required, or crippled, a key, of which we also reproduce an illustration, being set up on the indicator cabinet for the guidance of those operating the system.

Analysing the particular indicator selected for citation, we find that the number of the wagon was 1754. On May 1, 1919, it was loaded from Sheffield (Midland Railway) to Gamlingay (London and North Western Railway). At this stage the indicator would be showing blue in the space, and would be placed in the London and North Western section of the cabinet. The next movement, on May 6, was the loading of the wagon at Gamlingay to Sheffield, the blue square being retained to indicate that the wagon was making a loaded journey, and it will be noticed that the letter " L " appears in the right-hand column as a further notification of this fact. On May 9 the wagon was reported empty at Sheffield as spare, and the indicator would then be moved round to show white. On the same date the wagon was ordered to Lincoln empty, the indicator being moved to green and placed in the Nottingham area in the cabinet. On May 13 the wagon was loaded to Hounslow from Lincoln, and being again in freight the indicator was moved to blue and placed in the London and South Western Railway area. On May 19, the next date on the card, it was sent empty to St. Pancras, the indicator being moved to red, showing (*vide* key) that the wagon was required empty, in this case in the London area. On May 20, it was loaded to Burton, the indicator showing blue again for loaded, and the letter " L " to indicate the same condition being entered in column 3. The card would then be placed in the cabinet in the Burton area. On May 27, it left Burton for St. Pancras, loaded (blue, London area), and on May 29 it went to Wandsworth Road empty, the indicator showing red " on hand, required."

This shows that five loaded journeys were made between May 1 and May 29, 1919, a good record in itself, and one which would in all probability be impossible of achievement without the wagon distribution system, as then there would be no direct check on the movement of the vehicle from day to day. In this particular case the loaded mileage was 645 and the empty mileage 70. A separate cabinet is used for passenger train vehicles, that is to say, those employed for running on passenger trains conveying goods of various classes, also on perishable traffic and piped trains generally. The simplicity of the system is obvious. An operator is

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employed in moving the coloured squares into the correct position and entering up particulars on the paper slips, also keeping the indicators in their correct sections in the cabinet, in accordance with the information received. The whole thing works with such smoothness and absence of noise that it is difficult to appreciate the full significance of what is transpiring within the room, but the effectiveness and economy of the system are fully realised when the records are consulted and the magnitude of the various daily movements in well-ordered regularity is known.

In operating this system it is quite an easy matter to become acquainted speedily with the various manipulations of the indicators. As a case in point, a wagon may be wanted at Sheffield; the operator looks at the cabinet and sees where a wagon at the time required is available, selecting, as a matter of course, one that is standing nearest the point from which the demand has come, or one that has been loaded to the vicinity. The wagon selected would be shown on a card with the indicator at white, which means that it is "on hand, empty," and spare, or alternatively, blue, showing that the wagon has been loaded to the area. After arranging for the wagon to be sent forward empty to the point required, the indicator is moved to green and placed in the proper area on the cabinet, further movements being made in accordance with the explanations given above, when advice is received that it has been loaded and despatched, the colour being changed from green to blue, and so on.

The passenger train stock, other than passenger-carrying vehicles, is distributed on the same system as the specially constructed stock, indicators being also provided for these. Before a vehicle, loaded or empty, is moved, the train service from the starting point to destination is completely arranged, thus avoiding all possibility of confusion, or the inadvertent issuing of counter orders such as might possibly nullify the efforts made to work the traffic through quickly.

The system on the Midland Railway is unquestionably an excellently devised one, and has resulted in considerable benefit to the trading community.

AT NEWTON HEATH LOCOMOTIVE SHEDS.

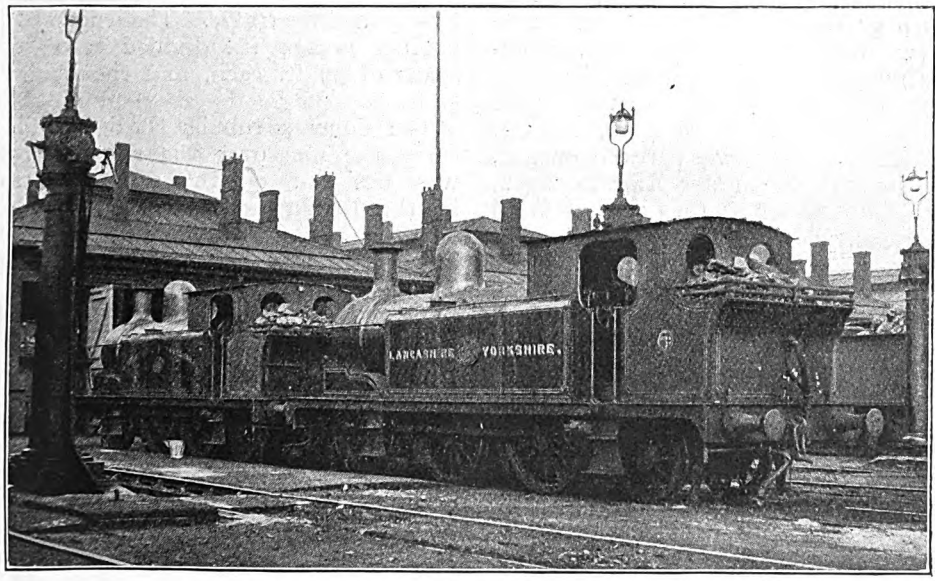

Photo.] LANCASHIRE & YORKSHIRE RAILWAY. [*P. F. Cooke.*

0-6-2 tank engines, Nos. 688 and 655.

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INTERIOR OF THE BRITANNIA TUBULAR BRIDGE.
Mr. Stephenson driving the last rivet. (*From an Old Print.*)

The Chester and Holyhead Railway.

THE IRISH MAIL ROUTE. [No. II.]

By H. H. MEIK.

Continued from page 97. Railway Magazine, *August*, 1919.

THE principal bridges and viaducts on the line may now be considered. The bridge across the Dee was constructed of iron with three spans, each 100 ft., having four trussed girders in each span on each side and two in the middle, making two roadways independent of each other, the whole structure being carried on two stone piers in the river. On Monday, May 24, 1847, shortly after it was partially opened, a Shrewsbury & Chester Railway train, which left Chester at 6.30 p.m., crossed the bridge, when one of the three spans gave way, and the whole train, with the exception of the engine and tender, fell into the river. Nine persons were killed and several injured. Fortunately the train was a short one with few passengers.

At Rhyl the line was carried over the river Clwyd by a wrought-iron drawbridge, with embankment approaches. Llandulas Viaduct was originally built of stone, over the river Dulas. On August 17, 1879, it was undermined by floods and completely washed away, thus interrupting traffic between England and Ireland. For two days nothing was done, but within the next five days a deviation of the line was made and a temporary trestle bridge erected, the first train crossing at 3 p.m. on August 24. Meanwhile a new structure was put in hand at Crewe, and on September 14 the present permanent viaduct was opened for traffic. The length of the viaduct is 224 ft., divided into seven spans of 32 ft. each, and the height is 50 ft.

The Conway tubular bridge, built to carry the line over the river Conway, was designed on the same principles as the Britannia Bridge. It was constructed to carry a double line of rails, and was made of wrought-iron tubes. The total length was 412 ft.

The foundation stone of the bridge was laid on May 12, 1846, and the first tube was floated on March 6, 1847, raised and placed on piers on April 16, and in use on May 1, 1847. By the end of October of the same year the second tube was also in use. The whole cost of the bridge was about £146,000. The engineer for the bridge was Robert Stephenson, his assistant being Edwin Clark.

The next two viaducts of importance are the Ogwen viaduct, crossing the

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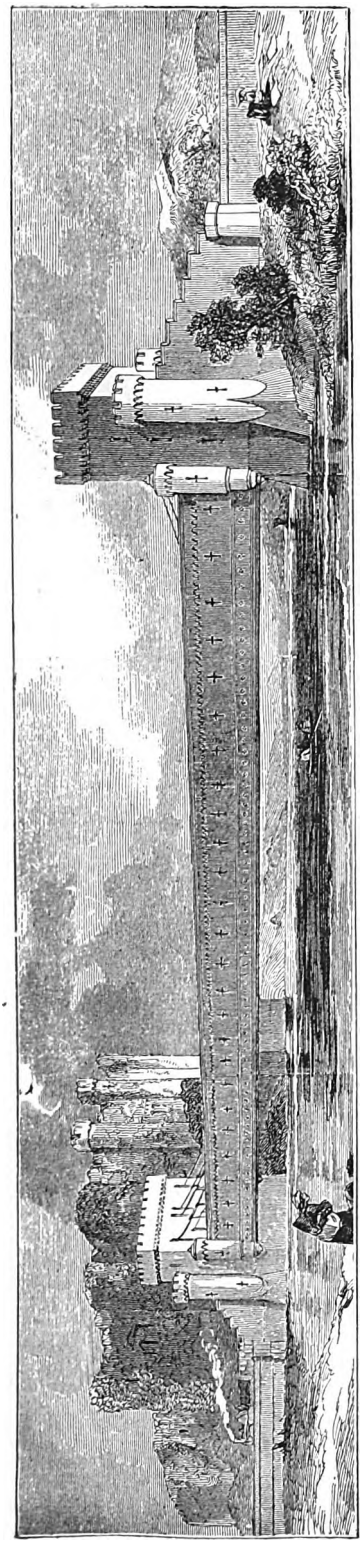

CONWAY TUBULAR BRIDGE.
(*From an Old Print.*)

river of that name, and consisting of 13 arches—it is 54 ft. high at the centre of the river—and the Cegyn or Cegid viaduct of seven arches. These are both situated between Aber and Bangor stations.

The Britannia Bridge crosses the Menai Straits at the Britannia Rock, situated in the middle straits, but before it was erected the Admiralty stipulated that its height should be such that it would not obstruct navigation. It is similar to the Conway Bridge in style, but is naturally of a larger construction. There are two independent tubes, each 1,500 ft. long, and these are supported at five places—at the two abutments and on three towers, the centre one being built on the rock before mentioned and being 230 ft. high. The two side towers are 212 ft. high and the two abutments 177 ft. high. The bridge has four spans —those over the water are 460 ft. each and the landward two are 230 ft. each. On the centre tower the tubes rest solid, but on the side and end towers they rest on roller beds so as to allow of expansion and contraction. Each tube is 15 ft. wide inside, and the height varies from 23 ft. at the ends up to 30 ft. at the centre. The first stone was laid on April 10, 1846, the first tube being floated June 19, 1849, and placed in position November 9, 1849. The second tube was floated December 3, 1849, and placed in position on January 7, 1850. The last stone was placed on one of the towers on June 22, 1849. One tube was opened for traffic March 18, 1850, and on October 19, 1850, the second line was opened for traffic. Total cost of the bridge, according to the late Samuel Smiles, was £234,450.

In Anglesea there is the Cefni Viaduct, also known as the Mallthreath or Bodorgan viaduct, of 19 arches, over the estuary or tidal river of the same name. It is situated not far from the present Bodorgan Station. Between Anglesea and Holy Island is the Stanley embankment across the Strait. This is virtually a causeway arched in the centre to allow the tide to ebb and flow. It carries both railway and road traffic.

Before the opening of the line the mails and passengers were forwarded either from Holyhead and Liverpool to Howth or Kingstown. The opening of the line,

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however, practically fixed the Holyhead-Kingstown route for good and all. In April, 1846, it was agreed in terms of an arrangement with the Government that the company should undertake to contribute £200,000 towards the construction of a harbour of refuge and packet pier at Holyhead, subject to the conditions embodied in a Treasury Minute of April 3, 1848. This sum, however, would appear to have been foregone by the Government, who had contracted for the conveyance of the Irish mails to Holyhead for £30,000 per annum for five years certain, renewable for seven years longer, the amount payable during the seven years depending on the net profit made by the company. The Government engaged, if necessary, to contribute a sum to the shareholders sufficient to secure a dividend of 5 per cent., such payment not, however, exceeding £30,000 per annum for the seven years.

By an Act of 1848 the company was empowered to purchase, hire and use steamboats, and for that purpose to raise an additional capital of £250,000 and to borrow £83,000. Their first ships were the *Anglia*, *Scotia*, *Hibernia* and *Cambria*, with a tonnage of 500 tons and a speed of 14 knots. At first the mails were conveyed in Admiralty vessels but in 1849 the Government called for tenders for the Irish mails, and the Chester & Holyhead Company did not tender (which was a mistake), as they thought they should have had the first offer of the contract, with the result that it was secured by the City of Dublin Steam Packet Company, which put boats on the Kingstown-Holyhead service in competition with the railway company's boats, much to the latter's annoyance. The contract has remained with the City of Dublin Company ever since.

When the line was opened to Bangor on May 1, 1848, there were four trains running each way as under.

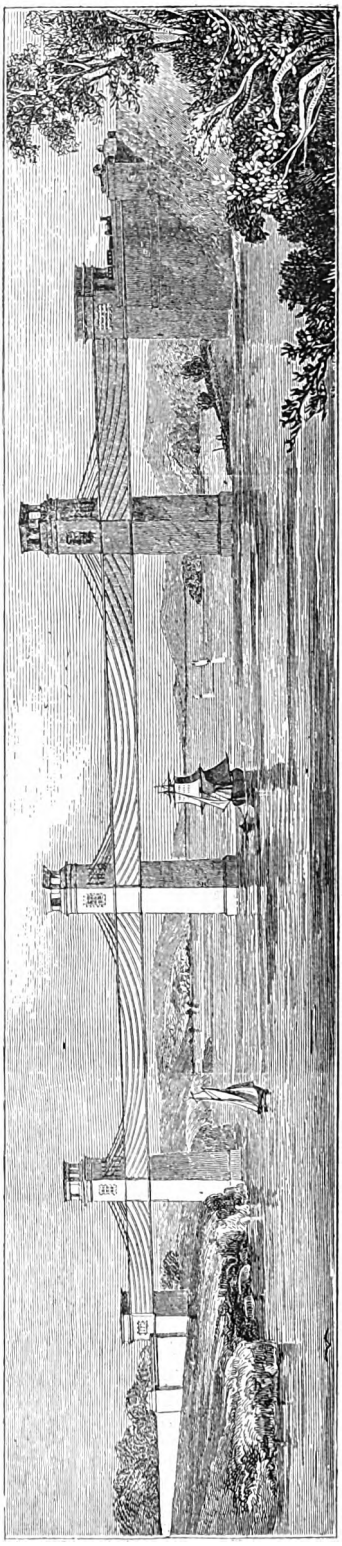
DOWN.

		a.m.	a.m.	p.m.	p.m.
Chester ..	dep.	8·0	10.15	1.45	4.25
Bangor ..	arr.	10.23	12.27	4.8	6.35

UP.

		a.m.	a.m.	p.m.	p.m.
Bangor ..	dep.	7.0	9.15	3.0	7.0
Chester ..	arr.	9.23	11.30	5.15	9.23

In August, 1848, the mail train left Euston at 8.45 p.m., and mails and



BRITANNIA TUBULAR BRIDGE OVER THE MENAI STRAITS.
(From an Old Print.)

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passengers were conveyed from Bangor to Llanfair over the Menai Suspension Bridge by coach. The train then left Llanfair at 6 a.m. and arrived at Holyhead at 6.45. The return train left Holyhead at 6.20 p.m., and, crossing the Menai Straits by the same means, reached Euston at 4.50 a.m. In July, 1849, the times were as follows :—

DOWN.

		p.m.	p.m.
Euston ..	.. dep.	5.0	8.45
		a.m.	a.m.
Holyhead	.. arr.	1.30	6.50
Kingstown	.. arr.	6.15	11.45

UP.

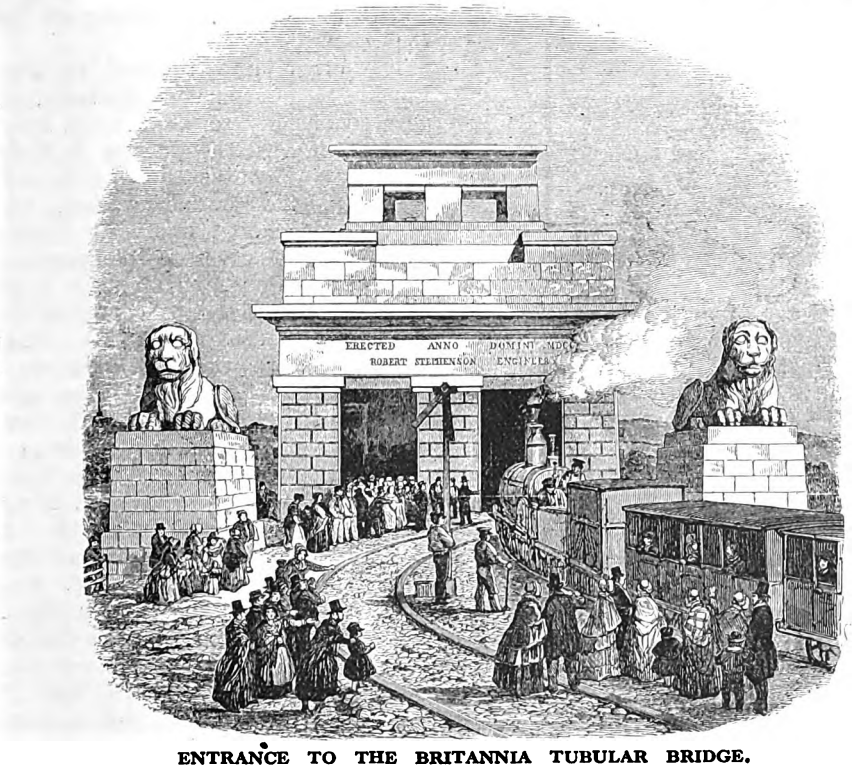
		p.m.	p.m.
Kingstown	.. dep.	12.30	7.30
		p.m.	a.m.
Holyhead	.. dep.	6.20	1.35
		a.m.	p.m.
Euston ..	.. arr.	4.50	1.0

By an Act of July 23, 1858, the Chester & Holyhead Railway became amalgamated with the London & North Western Railway, and in March, 1859, was dissolved as a separate company.

Total length of the line from Chester general station to Holyhead passenger station is 83 miles 32 chains. To the Pier Head it is 75 chains more.

Locomotives were built for the Chester & Holyhead Railway Company by the Vulcan Foundry Company, Newton-le-Willows and sent by sea to Holyhead to work the section first opened between Llanfair and Holyhead. These engines were supplied in 1847, and appear to have been six in number, respectively named *Britannia, Menai, Bangor, Carnarvon, Flint* and *Chester.* They were taken over by the London & North Western Railway and numbered 176–181 in their Southern Division List. All were of Stephenson's "long boiler" type and had cylinders 15 in. by 22 in., with two leading wheels 3 ft. 6 in. diameter and driving wheels 6 ft. diameter, the heating surface being 981 sq. ft.

Before the Chester & Holyhead Railway became absorbed in the London & North Western Railway two smaller lines had been acquired. One of these was the



ENTRANCE TO THE BRITANNIA TUBULAR BRIDGE.
(From an Old Print.)

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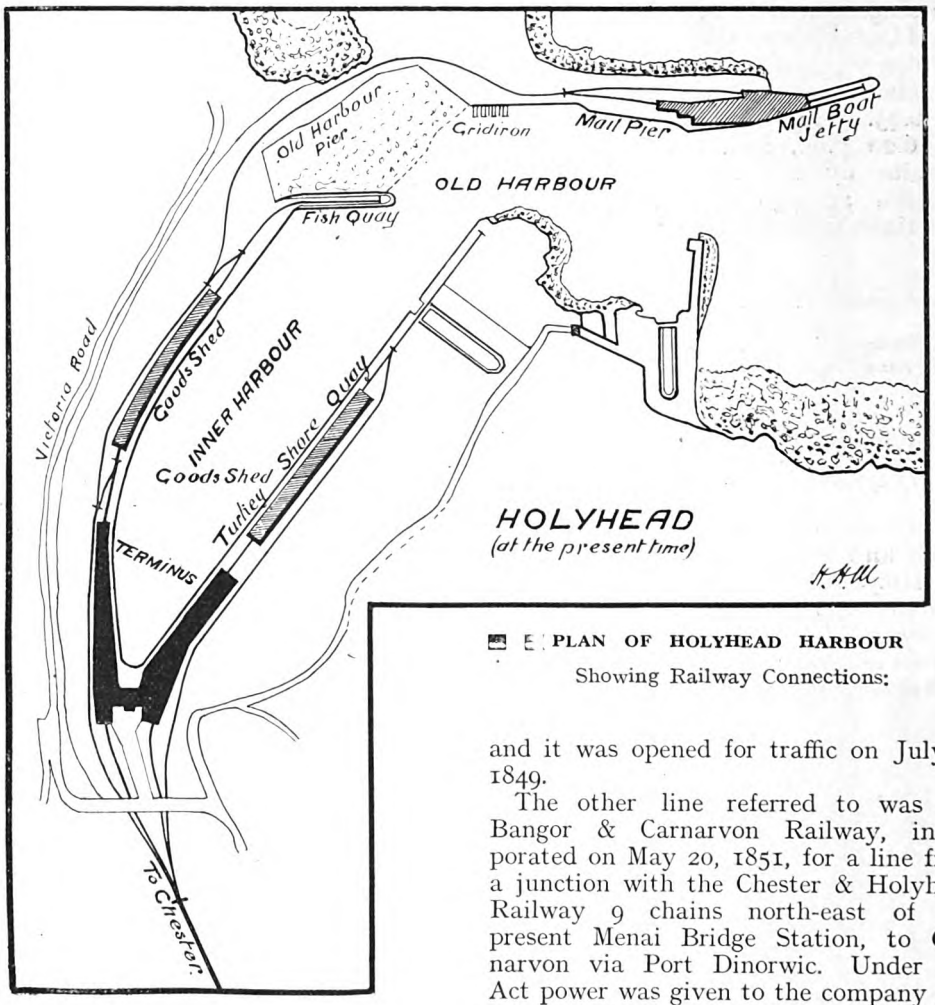

PLAN OF HOLYHEAD HARBOUR
Showing Railway Connections.

Mold Railway, incorporated July 9, 1847, for a line from Mold via Padeswood and Hope to Saltney Ferry (Mold Junction), with a branch to Queen's Ferry (afterwards abandoned). The company was authorised to raise a capital of £180,000 and to borrow £60,000. Under the Act of Incorporation leave was given to lease or sell the line to the Chester & Holyhead Company on such conditions as might be mutually agreed. The latter agreed to purchase the line when completed on terms to be fixed by arbitration. Total length of line was 9 miles 9 chains, and it was opened for traffic on July 1, 1849.

The other line referred to was the Bangor & Carnarvon Railway, incorporated on May 20, 1851, for a line from a junction with the Chester & Holyhead Railway 9 chains north-east of the present Menai Bridge Station, to Carnarvon via Port Dinorwic. Under the Act power was given to the company and to the Chester & Holyhead Company mutually to enter into contracts for the working and use of the line. Facilities were given to the neighbouring landowners adjacent to the line by granting them rails and sleepers in order to form short connecting branches into their prospective properties. This line was opened throughout on July 1, 1852, and was 6 miles 14 chains in length. It was leased to the Chester & Holyhead Railway from the date of its opening, and was taken over by the London & North Western Railway along with the Chester & Holyhead Railway.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN.

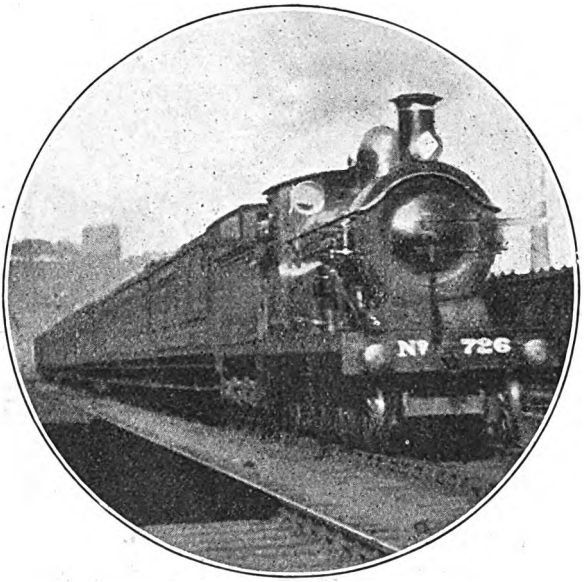

Photo.] [*Lt. B. T. Holberton.*

SOUTH EASTERN & CHATHAM RAILWAY.
Up Express near Folkestone. 4-4-0 engine, No. 726.

OF all the "reconstruction" time-tables, the Great Western is one of the most noteworthy of any, in view of the closeness with which the work required of the locomotives approximates to that of pre-war days. When we remember that the 60-mile limit is still in force on the Great Western Railway, it becomes clearly evident that many of the fastest schedules are very little altered in any respect other than that of maximum speed. For example, the re-instituted "Cornish Riviera" express at 10.30 a.m. *ex*-Paddington is allowed 15 min. over its pre-war times to passing Exeter, but runs in precisely the old point-to-point schedule from there forward to Penzance, where the arrival is at 5.15 instead of 5 p.m., the first stop, as of old, being at North Road, Plymouth, at 2.52 p.m. The passing times are 40 min. to Reading, 77 min. to Savernake, 103 min. to Westbury, and 158 min. to Taunton, and these apply also to the 11.30 a.m. down —a combination of the old 11.10 a.m. to Newquay and the 11.50 a.m. to Torquay —and the 3.30 p.m., which stops at Taunton in 158 min. from London. In the opposite direction the up "Riviera" is again unaltered from Penzance to Exeter, and thence runs up to town in 3¼ hours, 160 min. being allowed from Taunton, 105 from Westbury, 77 from Savernake, and 40 from Reading. Exactly similar times are observed from Taunton by the 11.5 a.m. and 1.35 p.m. non-stop trains from Taunton to London, which are thus in reality a shade faster than the "Riviera" express over this length, as no extra time is allowed for starting from Taunton instead of passing. The other two trains routed via Westbury call at Reading in addition to Taunton, but run in much the same schedules, the 1.45 p.m. *ex*-Paddington being allowed 123 min. and the 4.15 p.m. *ex*-Taunton 122 min. for the 107 miles between Reading and Taunton.

On the old main line *via* Bath the times are not quite so fast, the best allowances, shared by the 11.15 a.m. Bristol, 11.45 a.m. South Wales, 4 and 6.30 p.m. Bristol expresses, being 42 min. to Reading, 60 min. to Didcot, 85 min. to Swindon, 102 min. to Chippenham, and 118 min. to Bath, with 2 min. extra in each case to a stop, *i.e.*, 87 min. to Swindon with the 11.45, and 104 min. to Chippenham with the 4 and 6.30 p.m. down. Such times as 94 min. from Reading to Bristol (*via* Badminton, 81½ miles) by the 1 p.m.

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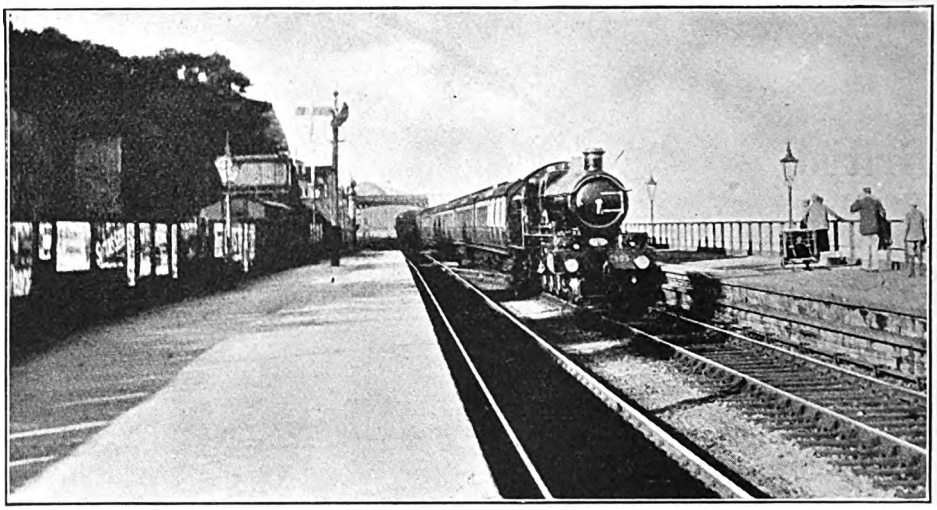

Photo.] GREAT WESTERN RAILWAY. [*E. A. Gurney-Smith.*

Down Cornish express passing Dawlish. 4-6-0 engine, No. 2905, "Lady Macbeth."

down, or 114 min. from Reading to Newport (97½ miles, including the Severn Tunnel) by the 8.45 a.m. down Fishguard express, are also quite good in all the circumstances. In the up direction, again, 122 min. from Bath to Paddington (by the 9.10 a.m. *ex*-Bristol) is an excellent time, only 7 min. in excess of the pre-war figure; 84 min. are allowed from Swindon, 58 from Didcot, and 40 from Reading, although the same times are made from Swindon by the expresses due in London from South Wales at 1.10 and 6.20 p.m. and from Bristol at 2.15 p.m. Actually the down newspaper express at 2.30 a.m. *ex*-Paddington is the fastest of the Bristol line trains, as it is booked to reach Swindon, (77¼ miles), in 83 min., and then, after a 5 min. stop, to run on to Bristol *via* Badminton, (40¼ miles), in 47 min., equivalent to a non-stop journey in about 127 min.

But as far as Didcot even the schedule of this train is beaten by the reinstated 4.45 p.m. down Worcester express, which passes Reading in 39 min. and Didcot East in 56½ min., reaching Oxford in 70 min. The 2.0 p.m. from Worcester to London is positively bettered, as compared with pre-war running, the 135 min. non-stop timing giving place to one of 140 min., which includes a 5 min. stop at Oxford, and a 70 min. run thence (56 min. from Didcot East and 39 min. from Reading) to Paddington. Both up and down trains also cover the 57½ miles between Oxford and Worcester in the very smart time of 65 min. Completing the catalogue, we have the 83 min. run of the down "newspaper" from Bristol to Exeter (75½ miles) and 85 min. over the same length by the 1.35 p.m. North express *ex*-Bristol, their respective times of 34 and 35 min. from Taunton to Exeter being an improvement even on the 37 min. allowance of the 3¼ hours' non-stop expresses from London to Exeter. In consideration of the continued limitation of high speed on the Great Western Railway, all these times are really noteworthy in present circumstances, as they involve very nearly as fast uphill work as previously with loads that are bound to be exceedingly heavy at the height of the season.

The principal feature of the current London & North Western time-tables is the number of very long non-stop runs that they appear to contain, such as Euston-Holyhead, Euston-Carlisle, Tamworth-Carlisle, and a large number between Euston and Crewe in each direction. In point of fact, however, the bulk of these journeys include intermediate stops for either locomotive or traffic purposes. The 11.5 and 11.15 a.m., 2.25, 5.20, 7.10 and 11.30 p.m. expresses *ex*-Euston, all nominally non-stop to Crewe, call in each

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case for 3 min. at Rugby to change guards, also the 4.8 a.m. from Crewe to Euston. Similarly, the 9.25 p.m. down Glasgow express stops at Crewe for locomotive purposes (1.3 to 1.13 a.m.), as also the 9.35 p.m. down, nominally non-stop from Tamworth to Carnforth (1.13 to 1.22 a.m.). The 8.10 p.m. Euston to Holyhead calls at Chester (11.49 p.m.) and forms the midnight train thence to Holyhead, where it is really due at 1.47 a.m. Again, the 10.43 p.m. from Crewe to Carlisle (7.10 p.m. ex-Euston) calls at Preston (11.49 to 11.52 p.m.), and the 12.45 a.m. from Carlisle to Crewe at the same place (2.49 to 2.52 a.m.) to change guards, while the 12.30 a.m. *ex*-Carlisle is booked to stop at Carnforth (2.1 to 2.4 a.m.) for the same purpose. Lastly, the 2.0 p.m. from Liverpool to London, apparently covering the 105 miles between Mossley Hill and Rugby without intermediate stoppage in 143 min., is scheduled to call at Crewe for 6 min. for locomotive purposes.

With these exceptions, the total number of actual 100-mile runs in the current London & North Western time-tables is 16, as follows:—Euston-Chester, 179¼ miles, 8.10 p.m. (219 min., passing Crewe in 191 min.); Euston-Crewe, 158 miles, 8.20 p.m. (194 min.) and 9.25 p.m. (218 min.); Crewe-Euston, 3.55 a.m. (200 min.); Crewe-Willesden, 152½ miles, 2.6 a.m. (184 min.); Crewe-Carlisle, 141 miles, 1.13 a.m. (187 min.) and 4.40 p.m. (192 min.); Carlisle-Crewe, 11.30 p.m. (188 min.) and 1.25 a.m. (189 min.); Euston-Stafford, 133½ miles, 4.45 p.m. (170 min.); Carlisle-Warrington, 117 miles, 11.45 p.m. (158 min.); Euston-Tamworth, 110 miles, 9.35 p.m. (146 min.); Crewe-Holyhead, 105¾ miles, 1.7 a.m. (133 min.); Holyhead-Crewe, 2.30 a.m. (134 min.); and Wigan-Carlisle, 105¼ miles, 11.57 p.m. and 12.15 a.m. (142 min.). Of these the 11.30 and 11.45 p.m. south-bound expresses from Carlisle are the only trains not publicly advertised; they are the continuations southward of the special train for Service men shown in the Caledonian time-tables as leaving Glasgow at 8.45 p.m. In addition to the trains mentioned, the non-stop Euston-Coventry run of 94 miles, which is now made by the 11.30 a.m., 4.30 and 6.50 p.m. down expresses, and the 3.5 p.m. up, as well as the 97-mile Nuneaton-London journeys of the 11.4 a.m. and the 6.21 p.m. up expresses (in 118 and 119 min. respectively), closely approach the 100-mile limit. Generally speaking, the London & North Western time-table embodies no extensive accelerations other than those rendered possible by the omission of intermediate stops. Thus the London-Liverpool

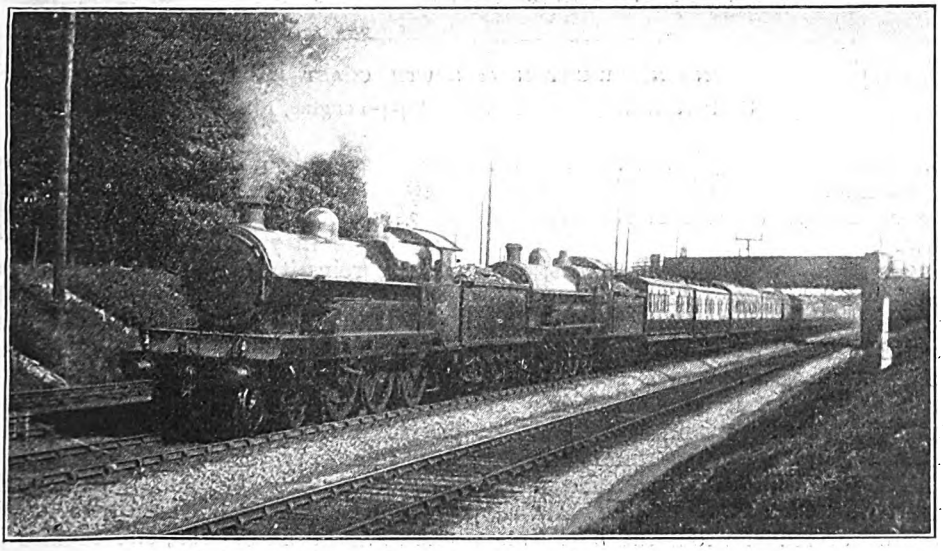

Photo.] LONDON & NORTH WESTERN RAILWAY. [*R. J. Osborne.*

Down Liverpool Express drawn by two "Claughton" engines, Nos. 162 and 155.

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standard time has been brought down to 4½ hours (11.5 a.m., 2.25 and 5.20 p.m. down, and 5.20 p.m. up—with the 2.0 and 4.5 p.m. up taking only 5 min. more); the London-Manchester time to the same figure (11.15 a.m., 2.35 and 5.30 p.m. down, and 8.30 a.m.—due 1.2 p.m.—12.5 noon, and 4.10 p.m. up, *plus* the 2.10 p.m., up in 4 hrs. 35 min.); but there has been no improvement of the Scottish services in any way commensurate with that instituted by the East Coast companies, the fastest times between London and Glasgow being 9½ hrs. in each direction by one train only—the 1.0 p.m. *ex*-Euston and the 9.45 p.m. *ex*-Glasgow. The 60 m.p.h. limit of speed is still in force on the London & North Western Railway.

As regards point-to-point times, the Great Eastern Railway time-tables throughout the war period have shown but little deceleration, although the end-to-end times have, of course, been greatly increased by virtue of the number of extra stops necessarily introduced in the schedules. The current summer time-tables show a substantial increase in the number of seaside expresses, but, with the exception of Hunstanton, the best times between London and the other well-known East Coast resorts are still well above pre-war figures. There is, however, some smart running required, the 12.30 p.m. down Cromer express, for example, being allowed only 65 min. to pass Colchester, as compared with the 64 min. of the "Norfolk Coast Express," while the 12.35 p.m. to Clacton reaches Colchester in 67 min. and the 4.55 p.m. to Yarmouth is booked to Ipswich in 88 min., against previous "bests" of 66 and 84 min. respectively. In view of terminal delays and *en route* slacks, also, such times as 58 min. from Mark's Tey (8.55 and 10.44 a.m.) and 50 min. from Witham (9.38 a.m.) to Liverpool Street leave nothing to spare. A good number of fast trains are reinstated on the Ipswich-Yarmouth section, while on the Cambridge line a non-stop booking between Liverpool and Cambridge in 73 min., is again afforded by the reinstitution of the special down Hunstanton express, at 11.25 a.m., which only ran for the first time in the summer of 1914. But there is as yet no non-stop up train. The bright feature of the Great Eastern Railway programme is the lavish provision of restaurant cars, no less than four trains each way on the Cromer service, two each on the Hunstanton and on the Yarmouth services, one to and from Clacton, one to and from Norwich *via* Cambridge, and one to Lowestoft by Ipswich and back by Cambridge, total 22, being so equipped.

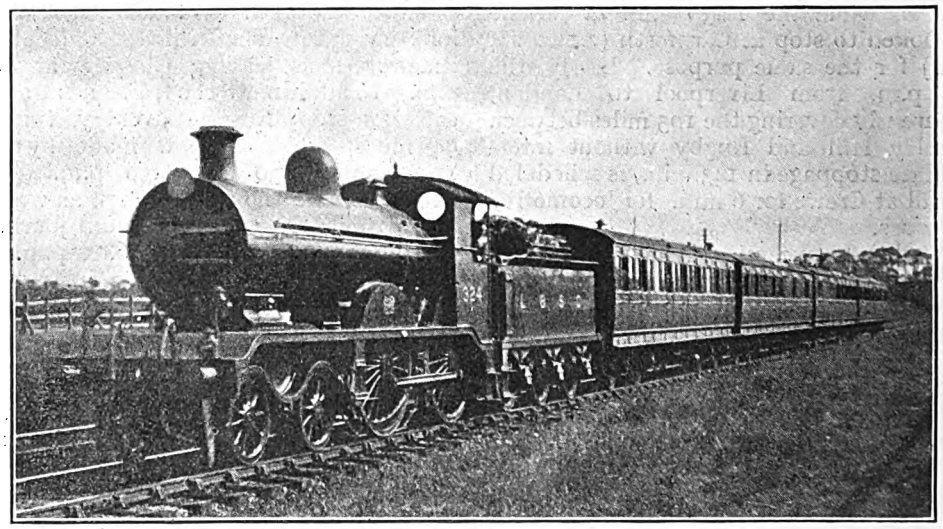

Photo.] LONDON, BRIGHTON & SOUTH COAST RAILWAY. [*F. W. Curtis.*

Up Portsmouth express. Rebuilt 4-4-0 engine, No. 324.

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Of other lines there is but little to write. The London, Brighton & South Coast Railway has restored the great bulk of its pre-war train services, but not to pre-war times, save on the Portsmouth service, where a non-stop run is made from Victoria to Fratton (84¾ miles) by the 11.35 a.m. down in the good time of 112 min., while a 54 min. time from Havant to Horsham (40½ miles), or 42 min. from Chichester to Horsham (31¾ miles) are neither of them to be despised over so difficult a route. Between London and Brighton only one train—the 6.35 p.m. *ex*-Victoria—has come down to as low a figure as 65 min., the "Southern Belle" retaining the 68 min. time on the down journey and 70 min. on the up. The 9.25 p.m. down on Sundays reaches Brighton from Victoria in 70 min., with an intermediate stop at Croydon. The Great Central Railway has made few changes in its main line times other than the reinstitution of the 10 a.m. from Marylebone to Bradford and the return train at 5 p.m., practically as booked in pre-war days, and also of the 3.40 p.m. from Manchester (London Road) to Sheffield. Most of the up trains on the London Extension have also had their times eased in the concluding stages from 2 to 5 min. But the Great Central Railway can still, on present times, claim the distinction of being the fastest line in the country. Lancashire & Yorkshire changes comprise a return to practically the full pre-war service, on times slightly increased in comparison with pre-war figures, but still distinctly "tight" between stops. As I have remarked previously, these comments must not be considered a full *résumé* of the improved services—restrictions of space render that an impossibility—but a collection of random impressions which I have had on perusal of the time-tables.

It is now with particular pleasure that I am able to give some details of current locomotive performance on the South Eastern & Chatham Railway, by the courtesy of Sir Francis H. Dent, the General Manager, who has furnished me with the necessary travelling facilities, the journeys concerned being made between London and Folkestone, Hastings and Margate. To Folkestone I travelled by the new 1.30 p.m. non-stop 90 min. express, loaded on this occasion to seven eight-wheelers, weighing 207 tons empty and 215 tons with passengers and luggage, of which there was not a large complement, owing to the trip being made early in July. The engine was a Wainwright 4–4–0, No. 740. From Charing Cross we threaded the tortuous 1·8 miles to London Bridge in 4 min. 55 sec., and

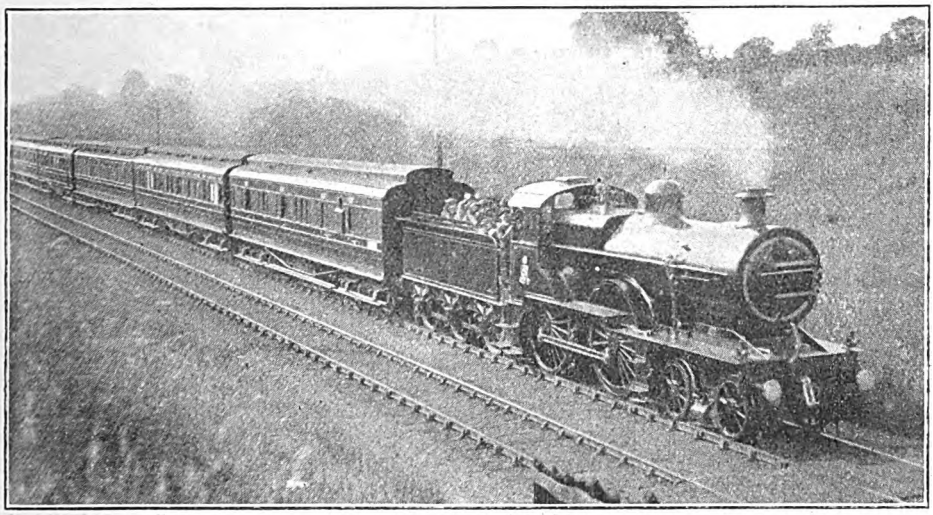

Photo.] MIDLAND RAILWAY. [*W. Bradshaw.*

Royal Train from Leicester to London (June 10, 1919) near Great Glen.

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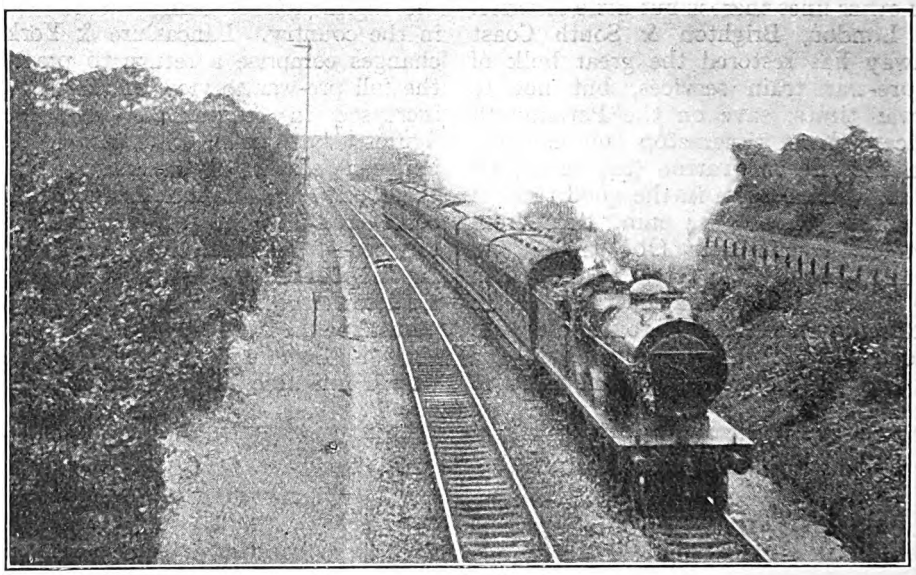

Photo.] SOUTH EASTERN & CHATHAM RAILWAY. [*P. S. A. Berridge.*

Up express approaching Sevenoaks Tunnel. 4-4-0 superheater locomotive, No. 772.

passed New Cross, 4·9 miles, in 9 min. 10 sec., at 50 m.p.h. From New Cross there is an almost unbroken rise for 12 miles to beyond Knockholt, and on the steeper parts of it—3½ miles at 1 in 140–120 to Elmstead and 2 miles at 1 in 120 past Chelsfield—we fell to 27 and 32 m.p.h. respectively, with an intervening maximum of 40 on the easier grades south of Orpington. So we took 10 min. 50 sec. from New Cross to Chislehurst, 6·3 miles, and 8¾ min. thence to Knockholt, 5·3 miles, where our total time of 28¾ min. from Charing Cross, 16·5 miles, was 2¼ min. behind schedule.

But we covered the 5·5 miles from Knockholt to Sevenoaks in 6 min. 20 sec., and the 7·5 miles thence to Tonbridge in 7 min. 35 sec., touching 64½ m.p.h. at Dunton Green, and 71½ beyond Hildenborough, while the lowest rate at the north portal of Sevenoaks Tunnel, up 2 miles at 1 in 160, was 51 m.p.h. Slacking to 40 m.p.h. through Tonbridge, we covered the 5·3 miles on to Paddock Wood in 6 min. 25 sec., accelerating on the favourable grades to 64 m.p.h., and the 7·1 miles on to Staplehurst, where we were again doing the same speed after a slight signal check at Marden, in 7 min. The 8·6 miles beyond to Pluckley, including 4 miles of easy ascent, on which the rate fell to 51 m.p.h., occupied 9 min. 10 sec., and the 5·6 miles thence to Ashford, which we passed at 61½ m.p.h., 6 min. 5 sec. Here we shed more than half our train in a slip portion, proceeding with a mere featherweight of 90 tons. We had run the 56·1 miles from Charing Cross to Ashford with full load in 71 min. 20 sec., or 70¾ min. net, and were now ¾ min. before time. So the subsequent work was not exacting, the 9·3 miles on to Sandling Junction, including a signal check at Smeeth, taking 10¾ min., and the final 4·6 miles down to Folkestone Central, mostly without steam, 5 min. 55 sec. Total time from London was thus 88 min. exactly, or 86½ min. net, and we could have cut this to 84 min. without the least difficulty. We ran from Knockholt to Sandling Junction, a shade under 49 miles, in 53 min. 20 sec., or rather less than 52 min. net, inclusive of the usual slack at Tonbridge.

Returning on the 5 p.m. up—one of the new Pullman car expresses—we had a heavier train of six eight-wheelers and two Pullmans, weighing 243 tons empty and 255 tons with passengers and luggage, one of the large 4-4-0 superheater engines —No. 763—being attached. Up the six miles averaging 1 in 265 to Westenhanger we accelerated to 39½ m.p.h., passing that

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station, 5·9 miles, in 10 min. 35 sec. (8¾ min. to Sandling), but after attaining 64 m.p.h. on the subsequent descent, we had a slight p.w.r. check just before Ashford, the 8 miles between these points taking 8 min. 35 sec. At the top of the faint ascent to Pluckley we were doing 51 m.p.h., the 5·6 miles from Ashford having taken 6 min. 20 sec., and the next 8·6 miles to Staplehurst were reeled off in 8 min. 25 sec., with a sustained maximum of 64½ m.p.h. at Headcorn. Staplehurst to Paddock Wood, 7·1 miles, took 7 min. 25 sec., and Paddock Wood to Tonbridge, 5·3 miles, 6 min. 5 sec., total 47 min. 25 sec., or 46½ min. net for a distance from Folkestone of 40·5 miles. It may be repeated here that all these 90 min. up Folkestone expresses are allowed in the working book 36 min. only for the 35·9 miles from Sandling to Tonbridge, passing in each case. Slacking to 35 m.p.h. through Tonbridge, we did not fall below 32½ m.p.h. on the 4 miles' ascent at 1 in 122 to Sevenoaks Tunnel (with a further fractional drop to 32 on the 2 miles at 1 in 144 through the tunnel), so that the 7·5 miles from Tonbridge up to Sevenoaks were covered in 13 min. 5 sec.; then, touching 54 m.p.h. on the short descent to River, we breasted the 3½ miles at 1 in 143–150 to the north end of Polhill Tunnel at a minimum of 36½ m.p.h., taking 7 min. 25 sec. from Sevenoaks to Knockholt, 5·5 miles. From there we ran most moderately down to New Cross, only for the briefest space attaining even the mile-a-minute rate, and suffering also a bad signal check at Hither Green; nevertheless, we covered the 14·3 miles from Knockholt to London Bridge in 17 min. 20 sec., passing the latter point in 85¼ min. from Folkestone (schedule is 85 min.), or 83 min. net. But for signal delays between London Bridge and Charing Cross we should have kept time without difficulty.

My Hastings journey was on the non-stopping 3.40 p.m. *ex*-Charing Cross, with a load of only six eight-wheelers, 179 tons tare and 190 tons full. We had again a large superheater 4–4–0—on this occasion No. 773, of the British-built series. Getting away smartly to London Bridge, which was passed in 4 min. 35 sec. at a severely-reduced rate of speed, we were through New Cross in 8¾ min., at 51½ m.p.h. Inclusive of a slight p.w.r. check at Hither Green, we took 10 min. from New Cross to Chislehurst, and including again a slight signal check at Chelsfield, we ran from Chislehurst to Knockholt in 8 min. 55 sec.—total 27 min. 40 sec. from Charing Cross, or about

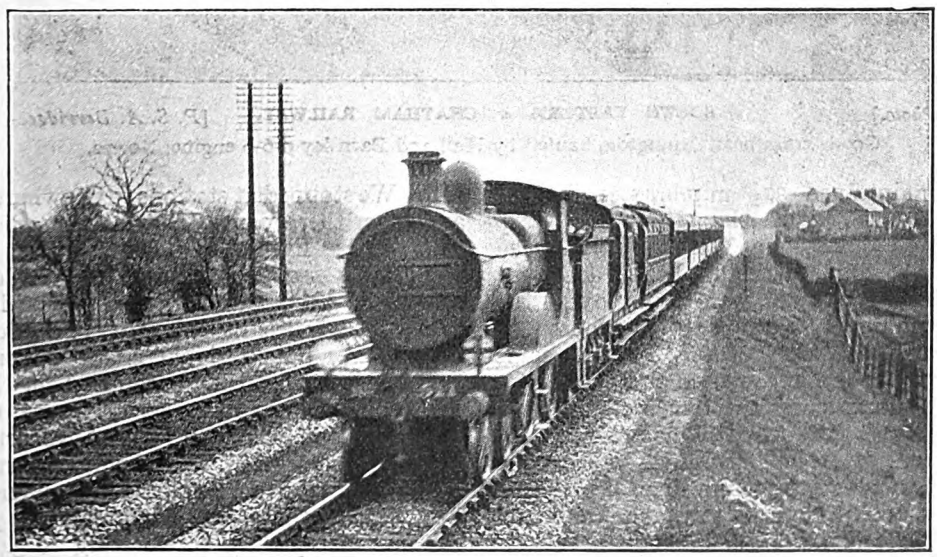

Photo.] **SOUTH EASTERN & CHATHAM RAILWAY.** [*P. S. A. Berridge.*

Up Folkestone express. 4-4-0 engine, No. 511.

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25¼ min. net. After Hither Green check we maintained 32½ m.p.h. up the 1 in 120 to Elmstead Tunnel. On Dunton Green bank we touched 65 m.p.h., but on Hildenborough bank steam was shut off after we had attained 66; the minimum rate beyond Sevenoaks was 51 m.p.h. So Knockholt to Sevenoaks took 6 min. 5 sec., and Sevenoaks to Tonbridge 7 min. 50 sec. Thus Tonbridge was passed in 41 min. 35 sec., just inside "time," or 39¼ min. net, speed being reduced to 35 m.p.h.

The ascent from Tonbridge to Tunbridge Wells begins at 1 in 53—for ¼ mile—and then flattens out to a general average of 1 in 95–100 for some 6 miles; up the latter we maintained 31½ m.p.h. steadily, increased to 40 on the short level strip through Tunbridge Wells, but dropped again to 36 m.p.h. before Frant, and very moderate speeds were run over the succeeding undulations to Wadhurst on account of sharp curves. For the same reason we did not exceed 62½ m.p.h. for some distance on the long descent from Wadhurst, but at Etchingham we had worked up to a sustained 71½ m.p.h. So Tonbridge to Tunbridge Wells, 4·9 miles, took 8 min. 55 sec., and Tunbridge Wells to Wadhurst, exactly the same distance, 7 min. 5 sec.; from there the 10·3 miles to Robertsbridge were covered in 10 min. 10 sec. As we were now before time, matters were taken easily on the concluding stage, speed falling to 37 m.p.h. on 1½ miles at 1 in 100 up beyond Robertsbridge, and to 42½ on 2 miles at 1 in 132–100 up past Battle, with an intervening maximum of 55½ m.p.h. So the 5·9 miles from Robertsbridge to Battle took 7 min. 55 sec., and the final multi-curved 6·2 miles to St. Leonard's 8 min. 40 sec., with the usual slacks. This gave a total time of 84 min. 20 sec., or 82 min. net, from Charing Cross.

Coming back on the 7.10 p.m. up, the same engine played with a five-coach load weighing only 138 tons, or 150 tons full. We stopped at stations to Crowhurst, and from there passed Battle, 2·1 miles, in 5 min.; Etchingham, 10·2 miles, in 13 min. 25 sec.; Wadhurst, 18·3 miles, in 26 min. 5 sec.; and reached Tunbridge Wells, 23·2 miles, in 32½ min. Schedule is 32 min., but a signal check beyond Etchingham more than accounted for the slight loss. Maximum speeds were 64 m.p.h. beyond Battle and 62½ at Robertsbridge, while after the check we ran steadily up the 1 in 100 which extends from Etchingham to Wadhurst at 33 m.p.h., subsequently accelerating to 34½. The highest speed before Tunbridge Wells was 58½ m.p.h. From Tunbridge Wells we ran with exemplary caution down the

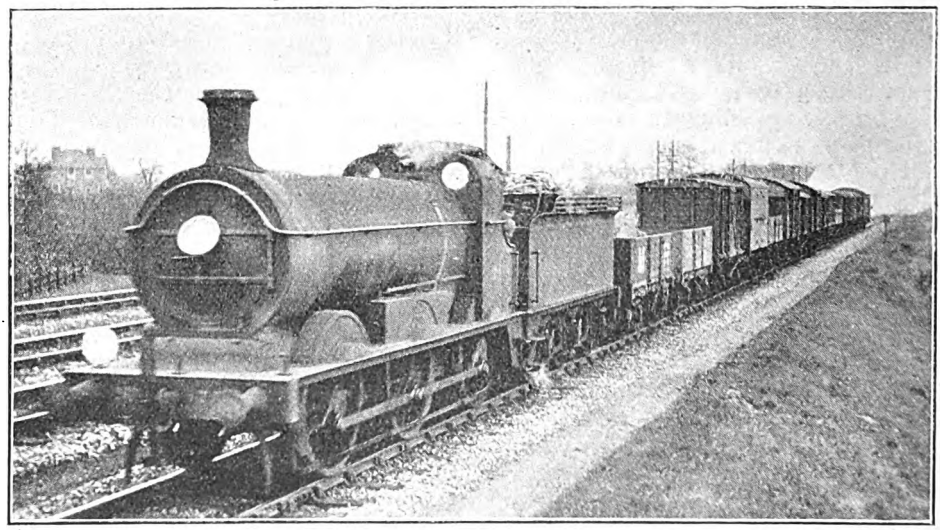

Photo.] SOUTH EASTERN & CHATHAM RAILWAY. [*P. S. A. Berridge.*

Goods train near Orpington, hauled by Hull and Barnsley 0-6-0 engine, No. 72.

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incline to Tonbridge, slacking frequently, and through the latter junction to 38 m.p.h.; this 4·9 miles occupied 8 min. 10 sec. Entering Sevenoaks Tunnel at 34 m.p.h. and leaving it at 31½ we ran from Tonbridge to Sevenoaks in 13 min.; up to Knockholt we proceeded under easier steam, taking 8¾ min. from Sevenoaks, as the train was on time. From there, with a signal check at Grove Park, we ran most cautiously down to a stop by signal just outside London Bridge in 18 min. 10 sec., making a total of 48 min. 5 sec. from Tunbridge Wells. Net time to London Bridge was about 47½ min., against a schedule time of 50 min. for this heavily-graded 34·4 miles' distance.

Part of my down journey to Margate I have tabulated in company with half-a-dozen excellent specimens of running from Herne Hill to Rochester and Chatham, sent by a friend. As is well known, this is a section of terrible grading, with long lengths at 1 in 100 inclination. After surmounting the 1 in 64 from Victoria to Grosvenor Road Bridge, down trains have to face adverse grades, with but slight intervals, from Brixton to Bickley Junction, a distance of 9½ miles. The inclination is at 1 in 100 up from Brixton to Sydenham Hill (2½ miles, on which trains calling at Herne Hill have to start); from Kent House to half a mile beyond Beckenham Junction (1¼ miles); while for 1¾ miles beyond Bromley the grade is 1 in 95. There are short intermediate descents at the former figure, notably for a mile beyond Penge, and three-quarters of a mile beyond Shortlands. After Bickley Junction there follow two marked "dips" in the line, the first down past St. Mary Cray for 1½ miles at 1 in 100, with a broken rise to Swanley of 2¼ miles, mostly at the same grade, then a corresponding descent to Farningham Road and ascent (Longfield Bank) to Sole Street, partly in each case at 1 in 100; but the general tendency of the line is still upward as far as Sole Street. Finally there comes the famous Sole Street descent of 6 miles on end at the same formidable grade, so winding as to preclude any high speed, and concluding with exceedingly sharp curves through Rochester Bridge and across the Medway.

In virtue of these serious hindrances the work tabulated is distinctly good. Nos. 474 and 483, which are Kirtley

SOUTH EASTERN AND CHATHAM RAILWAY. HERNE HILL TO CHATHAM.

	Run No.:	1	2	3	4	5	6	7
	Engine No.:	474	483	491	728	733	738	747
	Total load (tons):	190	225	225	200	220	275	280
Miles.		min. sec.	min. sec.	min. sec.	min. sec.	min. sec.	min. sec.	min. sec.
0.0	Herne Hill .. dep.	0 00	0 00	0 00	0 00	0 00	0 00	0† 00
1.7	Sydenham Hill pass	5 03	5 11	4 52 (a)	4 36 (b)	4 36	5 00	3 35
4.7	Beckenham .. ,,	9 22	9 45	9 42	8 46	8 46	9 11	7 50
6.8	Bromley .. ,,	12 08	12 43	12 55	12 00	11 22	11 51	10 50
10.8	St. Mary Cray .. ,,	17 53	18 38	18 46	17 03	16 36	17 19	16 45
13.6	Swanley .. ,,	21 19	22 07	21 59	20 03	19 51	20 39	20 15
16.5	Farningham Road ,,	24 10	25 00	24 39	22 38 (c)	22 34	23 25	23 15
19.3	Fawkham .. ,,	27 10	28 02	27 23	25 50	25 24	26 22	26 45
22.8	Sole Street .. ,,	32 02	33 07	31 30	30 29	29 54	31 15	32 05
28.9	Rochester Bridge ,,	39‡ 27	40 00	38 03	(d)	36 54	37 51	38 40 (e)
29.7	Rochester .. arr.	—	41† 19	39 42	(d)	38 28	39 33	40† 25
30.3	Chatham .. ,,	—	42 38	—	48 19	—	—	42 05

Signal checks:—(*a*) Penge and Kent House; (*b*) Beckenham; (*c*) Fawkham Junction; (*d*) Cuxton Road, Rochester Bridge and Rochester; (*e*) p.w.r. check, Medway Bridge.
† Passing time. ‡ Time of arrival.

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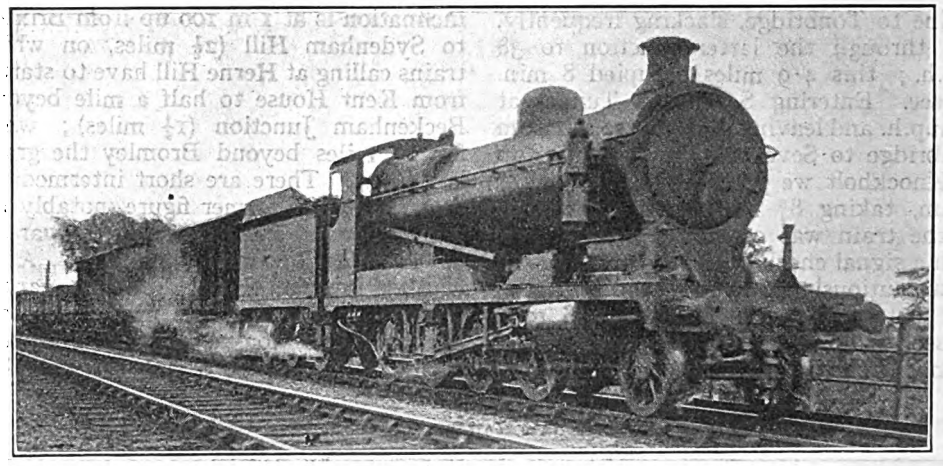

Photo.] GREAT WESTERN RAILWAY. [*Victor E. Newman.*

R.O.D. 2-8-0 engine (Mr. J. G. Robinson's design, and built to the order of the War Office), as taken over by the Great Western Railway and working a goods train near Taunton.

18 in. cylinder 4–4–0's, accelerated on Dulwich bank to 28 and 26 m.p.h., touched 54 and 50 m.p.h. beyond Kent House, and both fell to 37 m.p.h. at Bickley Junction. Maximum speeds at St. Mary Cray were 61 and 59 m.p.h., and at Farningham Road 67 and 65, with minima of 39 and 41 m.p.h. at Swanley and 36 and 34 m.p.h. on Longfield bank. Down Sole Street bank no higher speeds than 64 and 65 m.p.h. were reached. Thus No. 474 gained 3½ min. on a 43-min. schedule to Rochester Bridge, and No. 483, running rather faster round the concluding curves than is customary, cut all but 1½ min. off a 44-min. booking to Chatham, with a substantial load for this type of engine. No. 491, which is a Wainwright Belpaire 4–4–0, reached 29 m.p.h. on Dulwich bank, but then suffered signal checks, which affected the speed as far as Bickley. But excellent work was done after that, with maxima of 62, 70 and 65 m.p.h. at St. Mary Cray, Farningham Road and beyond Sole Street, and minima of 47 and 48 m.p.h. at Swanley and Meopham, the last-named being an unusual figure. Net time to Rochester on this run was 38¼ min. (schedule 42 min.), but the load was light. No. 728, a 6 ft. 8 in. Wainwright 4–4–0, started even better, with an acceleration to 31 m.p.h. at Sydenham Hill, but was also checked before Beckenham, and again at Fawkham Junction. A speed of 64 m.p.h. was reached at St. Mary Cray, and a maximum of no less than 73 m.p.h. at Farningham Road, with an intervening minimum of 49 at Swanley. Signal checks spoiled the final stage, but the net time to Chatham, with a 225-ton load, did not exceed 37¾ min. (booked 43 min.). The 90-min. expresses from Victoria to Margate are allowed 40 min. between passing Herne Hill and Chatham. No checks were experienced on the next two runs, which included accelerations to 30 and 28 m.p.h. on Dulwich bank, maxima of 57 and 54 m.p.h. before Beckenham, 63 and 62 at St. Mary Cray, 69 and 68 at Farningham Road, and 62 and 66 m.p.h. on Sole Street bank, while the lowest speeds were 44 and 39 m.p.h. at Bickley Junction, 45 and 44 at Swanley, and 41 and 37 m.p.h. on Longfield bank. Gains of 4½ and 2½ min. were made on the respective schedules, and No. 738's effort with 275 tons was a really good one.

My own journey was on the 9.10 a.m. *ex*-Victoria, and was made shortly after the Medway bridge fire, so that we were badly checked over the river, and had, in addition, to call at Chatham. We got through Herne Hill, 4 miles, in 9 min., and fell to 27 m.p.h. at Sydenham Hill; touching 55 m.p.h. at Kent House, we fell again to 33 m.p.h. at Bickley Junction. A top speed of 57½ m.p.h. at St. Mary

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Cray was succeeded by a fall to 42½ at Swanley, and then, strangely enough, the driver (although we were losing time steadily) shut off steam on Farningham Road bank, after just reaching 61½ m.p.h. This resulted in a poor ascent to Sole Street with a minimum of 31½ m.p.h., and although we attained 66 m.p.h. on Sole Street bank, our total time to Chatham stop was 51 min. 5 sec., or 50¼ min. net. We should by schedule have passed in 48 min. Re-starting on the 1 in 132 to Gillingham, we passed the latter town, 1·6 miles, in 4 min. 50 sec., ran the ensuing 8·8 miles to Sittingbourne (where steam was again shut off and speed not allowed to rise over 60 m.p.h.) in 11 min. 35 sec., and the 7·3 miles over Teynham "hump" to Faversham in 8 min. 40 sec. Here we slipped 125 tons, and proceeded, after the usual slack, much more briskly along the Kent coast. Speed rose to 66 m.p.h. at Herne Bay, fell to 44 on the slight rise beyond, and was then well maintained at 71½ m.p.h. past Birchington, although a p.w.r. check at the latter place unfortunately prevented a clear run into Margate. We covered the 6·6 miles from Faversham to Whitstable in 7½ min., the 4·1 miles thence to Herne Bay in 3 min. 50 sec., and the 8 miles on to Birchington in 8 min. 5 sec., but the last 3·2 miles into Margate took 4 min. 50 sec. Thus we had covered the 39·6 miles from Chatham in 49¼ min., or 48 min. net, but the 21·9 miles from Faversham had only occupied 24 min. 10 sec., or 23 min. net.

Returning by the 11.54 a.m. from Whitstable to London, which is scheduled non-stop to Victoria in 84 min., we had again to make an extra stop at Chatham. No. 747 was the engine, with a light load of 190 tons all told. From Whitstable we passed Faversham, 6·6 miles, in 10 min. 20 sec.; ran from there to Sittingbourne, 7·3 miles, in 8 min.; from Sittingbourne to Rainham, 5·8 miles, in 6 min. 5 sec., and from Rainham into Chatham, 4·6 miles, in 5 min. 20 sec.; total, 24·3 miles in 29¾ min., including Faversham slack. Top speeds were 66 m.p.h. at Sittingbourne and 64 after Rainham, with a minimum of 48 at Newington. Out of Chatham we passed Rochester Bridge in 3¼ min., and then climbed to Sole Street in a further 12 min. 20 sec., speed falling first on the 1 in 100 to 27 m.p.h., but later recovering to a shade over 30. From Sole Street down to Farningham Road took 7 min. 10 sec., with a maximum of 68 m.p.h.; from there to Swanley 3 min. 5 sec., and on to St. Mary Cray 3 min., with fluctuations to 45 and 64½ m.p.h.;

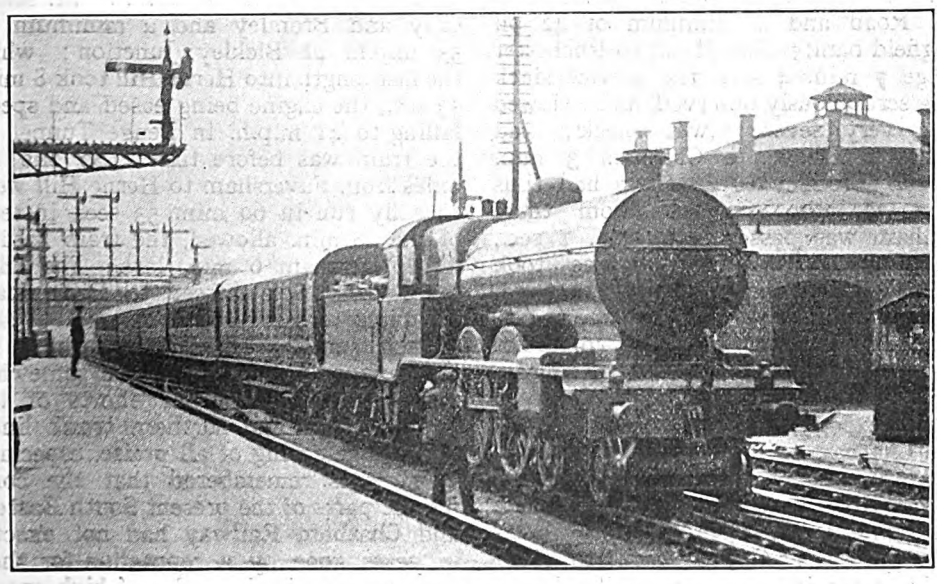

Photo.] LANCASHIRE & YORKSHIRE RAILWAY. [*K. A. C. R. Nunn*

Liverpool luncheon car express entering York. 4-6-0 engine, No. 1506.

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and from St. Mary Cray to Bromley 3 min., but this last stretch was hampered by adverse signals, and we were later brought to a momentary dead stop for the same cause at Shortlands Junction. This train takes the Catford loop, which is three-quarters of a mile further than *via* Herne Hill, and includes a very severe slack at Nunhead, but, inclusive of the Shortlands check, which cost fully 2 min., we ran from Bromley to Victoria in 19 min. 40 sec., having lost only 80 sec. on schedule, despite the last-mentioned delay and an extra stop of 2 min. 20 sec. (costing fully 4 min.) at Chatham. Net time from Whitstable to Victoria was thus 79¼ min. By the Herne Hill route we could have completed the non-stop journey easily in 74 min.

Lastly and briefly, a couple more excellent runs from a correspondent over the same route, timed before the institution of war time-tables. No. 730, 6 ft. 8 in. Wainwright 4–4–0, had a 225-ton load on the 5.10 p.m. business men's express from Holborn Viaduct, and was badly checked by signals as far as Bromley, which was passed in 20 min. 33 sec. Bromley to Swanley took 8 min. 49 sec., with a maximum of 61 m.p.h. at St. Mary Cray and a minimum of 44 beyond; Swanley to Sole Street 10 min. 15 sec., with a top speed of 67 m.p.h. at Farningham Road and a minimum of 42 on Longfield bank; Sole Street to Rochester Bridge 7 min. 4 sec., the service slack being scrupulously observed, and followed by a very severe p.w.r. check; and Rochester Bridge to Chatham 3 min. 13 sec. Bromley to Chatham had thus taken 29 min. 21 sec. From there Rainham was passed in 7 min. 1 sec., and Rainham to Sittingbourne took 6 min. 8 sec., inclusive of a slight signal check, which limited the maximum rate to 62 m.p.h. After a fall to 49 m.p.h. beyond Teynham, the Sittingbourne-Faversham length was completed in 8 min. exactly, making 21 min. 9 sec. from Chatham to Faversham, 17·7 miles. Here the loss of a heavy slip portion reduced the train to one of 125 tons, and, thus lightened, No. 730 ran from Faversham (passed slowly, as usual) to Whitstable in 7 min. 30 sec.; Whitstable to Herne Bay in 4 min. 4 sec.; Herne Bay to Birchington in 7 min. 34 sec., and Birchington to Margate in 4 min. 1 sec.; total, 23 min. 9 sec. for the 21·9 miles from Faversham and 94 min. 12 sec. from St. Paul's. But the net time did not exceed 88 min., which involved a throughout average of 50·6 m.p.h. over this very difficult road. Highest speeds on the coast line were 64 m.p.h. at Herne Bay and 71 at Birchington, with an intervening minimum of 52. This was thus a first-class run.

On the up Sunday evening express, at that time leaving Faversham at 7.5 p.m., No. 577, of the same type, had a 240-ton load on an evening of drizzle and fresh south-west wind. Sittingbourne, 7·3 miles, was passed in 10 min. 34 sec., at 65 m.p.h.; Rainham, 13·1 miles, in 17 min., with a minimum of 49 m.p.h. on Newington bank; and Chatham, 17·7 miles, in 22 min. 5 sec., at reduced speed. Chatham to Rochester Bridge took 2 min. 13 sec., and, after a severe slack over the curve, Rochester Bridge to Sole Street was run in 10 min. 29 sec., with a minimum of 30 m.p.h. on the long ascent. Sole Street to Swanley took 9 min. 33 sec., speed rising to 73 m.p.h. at Farningham Road, and only falling to 53 at Swanley; Swanley to Bromley 6 min. 23 sec., with maxima of 64 and 60 m.p.h. at St. Mary Cray and Bromley and a minimum of 55 m.p.h. at Bickley Junction; while the last length into Herne Hill took 8 min. 53 sec., the engine being eased and speed falling to 41 m.p.h. in Penge Tunnel as the train was before time. So the 48 miles from Faversham to Herne Hill were actually run in 60 min. 53 sec., instead of the 68 min. allowed, the train having left Faversham 6 min. late. The 18·1 miles from Sole Street to Beckenham Junction were covered in 19 min. 38 sec.

Such runs as these lose nothing by comparison with many of the somewhat more advertised pre-war efforts of the larger western and northern trunk lines, and are deserving of all praise, especially when it is remembered that the component parts of the present South Eastern and Chatham Railway had not exactly in years gone by a reputation for their achievements in the realm of high speed.

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A Peep into the Future.

ELECTRIC TRACTION.—No. II.

By C. SYLVESTER, A.M.I.E.E.

OUR next problem—and it is no small one—will be the selection of sites for the proposed "super-power" houses.

In the general design of generating stations, attention should be directed to the attainment of maximum simplicity consistent with economy. In the case under consideration it would appear to be most practicable if the whole of the traction system were divided up into areas, each with a centrally-situated power-house. Selection of sites must, however, be influenced by several factors, the principal of which are the facilities for the supply of coal and water. I mention coal here because at present sufficient statistics as to the efficiency of oil fuel from a generating station point of view do not appear to be available. Gas-fired boilers have received a certain amount of consideration, but, from a power-house point of view, they are still in the experimental stage. No doubt oil-fuel boilers will come, but, for the present, we must fix our power-houses in positions where coal can be easily supplied and handled.

In some parts of the country there are excellent facilities for the supply of both coal and water. Take, for instance, the London & North Western Railway system. One of the most suitable sites for a super power-house would be between Atherstone and Polesworth. Here a large water supply can be obtained from numerous canals. Apart from this, a large reservoir could be made which would collect water from the surrounding hills. The coal facilities here are also excellent, several collieries being in the vicinity. Moreover, the position is quite close to the Rugby and Nuneaton loop via Coventry, and a sub-station at Coventry would conveniently supply the route via Birmingham and associated lines. The number of power-houses to be built will depend upon the traffic in the region in which they are situated.

In regard to high-tension transmission lines, it would certainly be looking ahead if a spare conductor were carried from the power-house to each sub-station in case one line gave out. It is one of the necessary precautions that will be appreciated when a breakdown does occur, although it may be looked upon by some engineers as a waste of money.

Where connection is made between the power-house and the transmission lines, a four-way link box can be inserted in place of the ordinary three-way box. In case of breakdown to any one of a set of lines, it is a simple matter to run the compound out from the box, move the cable of the faulty line over to the spare terminal, and re-solder up. The movement of cables would be carried out as follows:—

(1) If No. 1 line is faulty, then No. 1 cable would be moved over to the spare line.

(2) If No. 2 line is faulty, then No. 1 cable would be moved to the spare line, No. 2 taking its place on the No. 1 line.

(3) If No. 3 is faulty, then in a like manner No. 1 would be placed on spare, No. 2 on No. 1, and No. 3 on No. 2.

If this arrangement is adopted, there will be no necessity to trouble about rephasing out, a business which is always a nuisance when there is a doubt about correct connections.

Apart from the power-house being situated near to a colliery, the coal-handling plant should be very carefully designed. There should be a minimum amount of labour and time spent in transferring coal from railway wagons to the coal hoppers. A very satisfactory system of coal handling is that used at the London & South Western Railway power-house at Wimbledon Park, London, S.W. Here the coal is run in railway wagons up an incline and emptied direct into the hoppers. The space under the incline also acts as storage for coal.

Power-house equipment will have to

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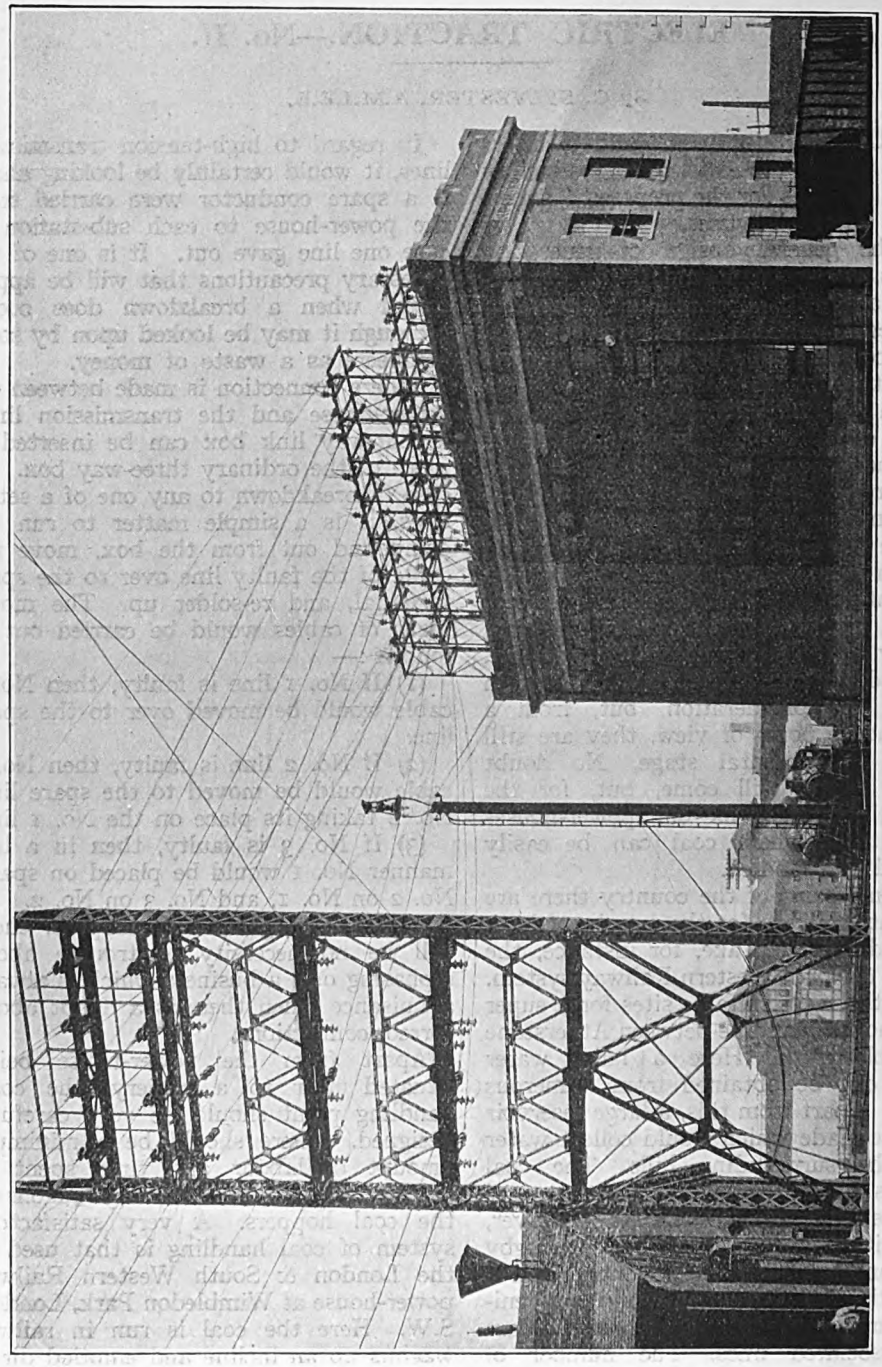

A NOTABLE SUB-STATION AND TRANSMISSION LINE SYSTEM: PENNSYLVANIA RAILROAD.

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be very carefully considered before it is installed. One cannot afford to experiment with equipment on such a large scale. It must be absolutely reliable in every sense of the word.

One large electrical engineering manufacturing company has designed a 20,000-kw. turbo-generator, which will run at a speed of 3,000 r.p.m. per minute, thus increasing the efficiency and reducing the coal consumption about 15 per cent., and, in addition, they are building an explosion-proof pit in which the machine may be run to destruction. This is a very costly experiment, but as it means efficiency it is certainly a step in the right direction.

Regarding the size of units, it will be well to consider this item from every point of view. It will be ridiculous to economise in one direction if time, efficiency and labour are to be wasted in others. For instance, mention has been made of the introduction of high-speed turbines to reduce steam consumption to the extent of 15 per cent. If there is to be any advantage gained from this it will be necessary to run the turbines in the most efficient manner. The size of units should, therefore, be carefully selected to meet the requirements of all conditions of load.

It must be remembered that the load will not only be fluctuating, but at times will be very heavy. Assuming that the turbine plant installed will provide for a maximum output of 80,000 kilowatts, the units to provide this should be arranged as follows :—

(1) Three 20,000 kw. machines.
(2) One 10,000 kw. machine.
(3) One 5,000 kw. machine.
(4) One 20,000 kw. machine to act as a spare in case of breakdown to any of the other units.

Under full load the four 20,000 kw. machines would be running, thus obtaining maximum efficiency from the plant.

We will now assume that it is known that 10,000 kw. of this load will be removed for a few hours. Then one of the 20,000 k.w. units could be taken from the bars and a 10,000 kw. unit substituted. It would be ridiculous to run a 20,000 kw. unit when a 10,000 kw. unit will do the work. Should a total shut-down occur to any one large unit, then there will be a deficiency of only 5,000 kw. providing the station is working under full load.

Regarding air or vacuum pumps, I do not think that the system in general use can be improved upon. This system really comprises a separate motor with vacuum pump for each unit. I have seen a scheme drawn up which provides for one large motor-driven vacuum pump for the whole of the units in a station. It may be claimed that this system is more economical than separately-driven air pump units. This may be so, but safety or immunity from risk of break-down should come before economy. If the large motor were to break down, then there would be a total shut-down of the station unless, of course, it was decided to run the machines on atmosphere—a very inefficient and costly method at any time.

Referring to the starting of air-pump motors, precautions should be taken to provide a means of starting these in the case of a total shut-down. It is, of course, possible for the rotary converters in the sub-stations to take power from the live rail and generate alternating current, which, through suitable transformers, would supply current to the air-pump motors. Apart from this, however, each station should have a set of accumulators installed, so that power can be taken from them to operate a motor converter.

Before dealing with the design of switchboards to meet the requirements of the super power-houses, a few words may be said concerning the voltage and type of current to be generated.

It is safe to say that three-phase alternating current will be generated, and transmission line voltage should not be less than 22,000 volts. This would be transformed down in the sub-stations to about 550 volts, and, through rotary converters, up to, say, 800 volts. The live rail voltage of the London Underground and associated railways is 600 volts. There is no reason why, now that improved methods are provided for insulating switchgear and the armature conductors of the motor, a voltage of 800 volts should not be used. This is an increase of 30 per cent. over the present voltage, but, for the same power, it means a 30 per cent. decrease in the cost of cable, &c.

Much is claimed for high-potential

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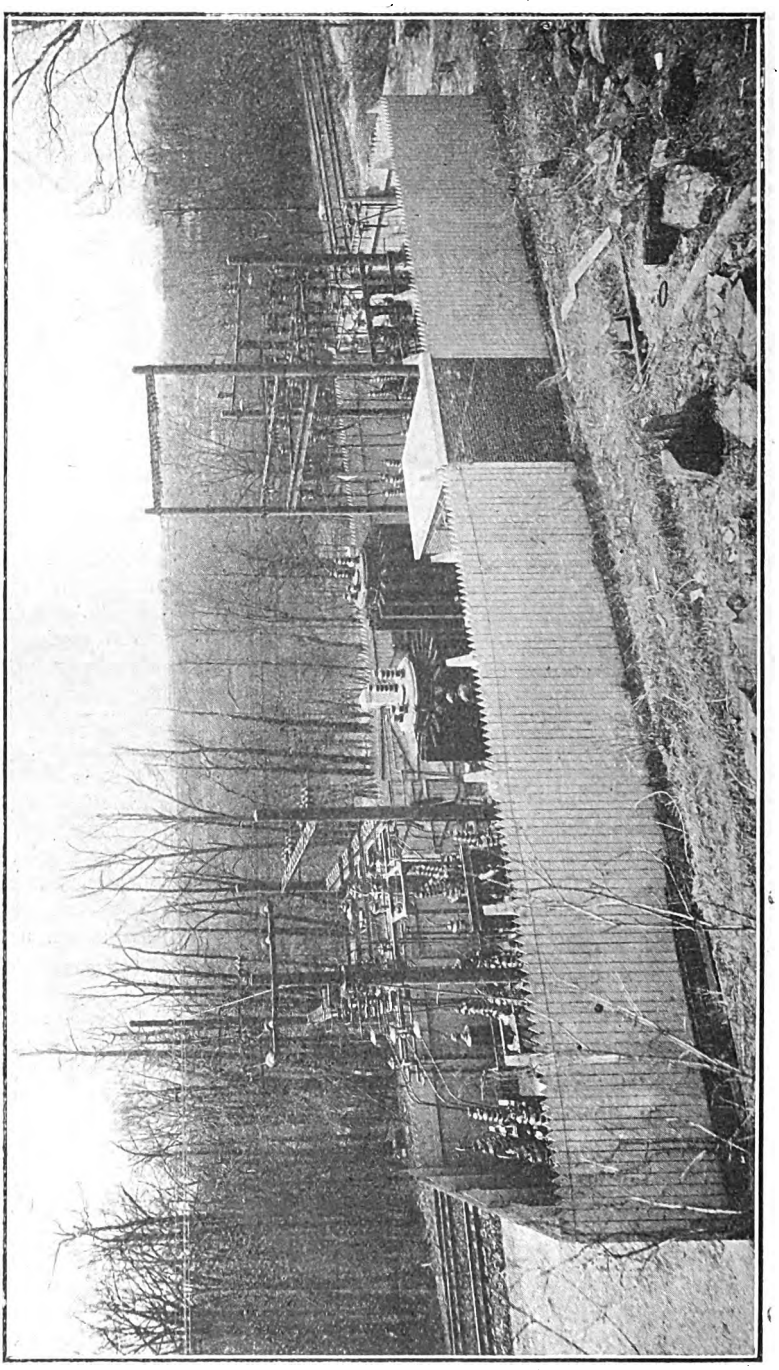

OUTDOOR TRANSFORMER STATION : PENNSYLVANIA RAILROAD.

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continuous current. This can be used for some purposes, but it does not appear to be suitable for traction purposes.

Concerning switchboards, there is no doubt that the cellular concrete type of board will be used. Insulators will have to receive the same consideration as suggested in connection with the insulators used for the high-tension transmission lines, owing to the increased generator voltage, which will be necessary to reduce to a minimum the capacity of the main cables and bus bars.

The operation of the generator main switches will see the electrically-operated method further improved. It is a great pity that this method was not developed years ago. There are several power-houses in the country where the system is installed, but it has been discarded in favour of the hand-operated method of closing and opening the switch. After all, it is much easier to press a button to close a switch and to press another button and so short-circuit the solenoid to open it. It may have been that the solenoid method failed occasionally, but this was only due to imperfection in design. Recent developments now show that the system is perfectly reliable, and as such it should be adopted.

Main oil switches should also work in conjunction with the turbine over-speed device. This device at present merely consists of a trigger fitted near the turbine governor. If the speed of the turbine exceeds a predetermined value this trigger operates a lever, which releases the main stop valve, the closing operation being performed by means of a spring. It will be a simple matter to fit electrical contacts which will short-circuit the main oil switch solenoid should the turbine overrun.

As far as possible each unit should supply its own switchboard, the various switchboard bus bars being capable of connection through motor-operated triple-pole rotary switches; the latter item to be used in the event of the breakdown of any one machine.

This system has the advantage that a machine may be run up and immediately placed upon the main bus bars without any delay through synchronising. Delays in the electric traction systems which are to come will not only be dangerous, but expensive, and every precaution should be taken to provide against this.

From the foregoing remarks it may be considered that the duties of the switchboard attendants will be increased. This is not so if a master control panel is used and supervised by the chief switchboard attendant.

Instruments can be fitted upon the master panel which will indicate the voltage and load upon each generator. The exciter voltage and amperes will also be recorded. Thus, each machine attendant can be communicated with as desired through the usual power-house signalling board.

As far as turbine control is concerned, this can be carried out by the various switchboard attendants upon instructions given by signals from the master control panel—that is, of course, if the turbine control gear is motor-operated.

I think the above discusses the principle upon which the super power-houses will be constructed. Safety devices such as Merz-Price gear and the use of reactances will be extensively used; but as these are in general use their advantages need not be discussed.

(To be continued.)

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Locomotive and Train Working in the latter part of the 19th Century.

MIDLAND RAILWAY. [No. V.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

IN the August RAILWAY MAGAZINE I concluded with some mention of the Swansea Vale section of the Midland, but to complete the account of the peculiar Midland connections to South Wales some further notes appear to be necessary. The old Hereford, Hay and Brecon Railway was taken over by the Midland at about the same time as the Swansea Vale Railway. This line ran from Hereford (Moorfields) to Three Cocks Junction, where it joined the Mid Wales Railway, a line since amalgamated with the Cambrian Railways. From Three Cocks Junction the Hereford, Hay and Brecon Railway (afterwards the Midland) used the Mid Wales line to Talyllyn Junction, whence the road into Brecon is the property of the Brecon and Merthyr Railway. The Neath and Brecon Railway extended to Ynisygeinon Junction with the Swansea Vale Railway, and not to Colbren Junction as stated in the August issue.

There were through carriages from Birmingham (New Street) to Swansea on two trains each day; these were taken by Midland engines and trains to Worcester. No Midland passenger trains worked between Worcester and Hereford, and therefore the through coaches were attached to the rear of Great Western trains at Worcester, and detached at Barr's Court Junction, Hereford. From Barr's Court Junction they were taken to Barton Station, over the north curve, by a small Midland 0-4-2 tank engine, usually 200A, and at Barton were attached to the Midland train for South Wales. These trains were worked thence from Hereford by Midland engines throughout, although from Three Cocks Junction to Ynisygeinon Junction they ran over the lines of three different companies before the Midland lines were again reached. On the other hand the Midland ran goods trains with its own engines right through from Brecon to Birmingham over the Great Western line between Hereford and Stoke Works (near Bromsgrove).

The Midland did not obtain any locomotives from the Hereford, Hay and Brecon Railway, for it appears that the latter line had got into debt to the Brecon and Merthyr Railway, which had worked the line for them for some time, and the Brecon and Merthyr, having ideas on the "business as usual" principle, took possession of the four locomotives belonging to the Hereford, Hay and Brecon—before the Midland had the chance. These engines, two 2-4-0 passenger, and two 0-6-0 goods were of the same class (by Sharp, Stewart & Co.) as those so long associated with the Furness and Cambrian Railways.

The opening of the Settle and Carlisle road necessitated goods engines of much greater power, and 120 new 0-6-0 engines —Nos. 1142 to 1251, 381 to 385, and 400 to 404—were built in 1875–6 by various makers. These had 4 ft. 10 in. wheels, and 17½ in. by 26 in. cylinders. A very large number were stabled at Hasland and Wellingboro for the main line coal traffic, and a few were sent to Bradford. Nos. 1222 to 1251, stationed at Carlisle and Leeds, worked the whole of the Scotch express goods traffic between these points for nearly 30 years. The Carlisle goods drivers were noted for the high speed at which they worked their trains, and with the 1222 class they used to do some very fast running. The signalmen between Carlisle and Leeds would always give the Carlisle goods drivers "the road" even when they were within measurable distance of a following express passenger train, because the signalmen knew that the goods train would keep clear, but when the Leeds goods drivers came along they were promptly shunted into the nearest siding until the passenger train had passed. The arrival of these, Mr. Johnson's earliest goods engines, in 1875, was the cause of a quaint error on the part of one

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of the main line signalmen. Hitherto, all the Midland goods engines of Mr. Kirtley's design had had the brass figures denoting the number fixed on the middle of the boiler. Mr. Johnson placed the numbers of his new engines on the side panels of the driver's cab. It was always, and still is, customary for the Midland signalmen to record the number of every engine that passes the signal box. This rule, which as far as I know is exclusively adopted by the Midland, was probably originally due to the idea that if the signalman had to note the number of the engine, he would naturally keep a sharp look-out on the whole train as it passed him. One night, a main line goods train drawn by one of Mr. Johnson's new

MR. S. W. JOHNSON'S FIRST GOODS ENGINE DESIGN, 1875-6.
Wheels, 4 ft. 10 in. diam. Cylinders, 17½ in. by 26 in. Pressure, 140 lb. per sq. in.
Series 1222 to 1251, built by Neilson & Co., 1876, were stationed at Carlisle and Leeds and worked Scotch express goods trains between these two centres for about 30 years.

engines was suddenly pulled up for train examination in response to a bell signal from the preceding box. After fruitless search, and nothing wrong had been found, enquiries made resulted in the discovery that the signalman in the latter box had reported "engine lost its number." He had flashed his light along the boiler of the passing engine and discovered to his surprise that the number was missing.

A famous class of goods engines—Nos. 1357 to 1376—came out from the works of Messrs. Dübs & Co. in 1878. Having 5 ft. 2½ in. wheels and 17½ in. by 26 in. cylinders they were termed the "express goods" class, and were the first goods engines to be fitted with steam brakes. Nos. 1357 to 1371 were sent to Bradford, and I believe they put in more mileage than any other goods engines on the line. Each night there were four of them running through (two in each direction) between Bradford and London on the fastest express goods trains that the Midland then worked. The mean booked speed of these trains was about 35 m.p.h., and they carried express passenger head lights. The 1357 class did this work for many years, and I think that most of them are still at work at Bradford. They also ran the Liverpool express goods trains from Bradford *via* Barnsley and the Manchester, Sheffield and Lincolnshire main line on alternate nights, and also worked what used to be known as the Burton beer train between Burton, Leeds and Bradford. I should also mention that the 1357 class had excellent boilers of large size, with a heating surface of 1313 sq. ft. Similar engines, 1432 to 1471, were built in 1880-1, and stationed at Manchester, Burton and Birmingham, but London did not obtain any of the "express goods" class until the end of 1883, and another important shed—Bristol—had to wait until 1892, being served in the meantime by the older double-framed goods engines of less power.

The question of continuous brakes during the years 1878 to 1885 proved a somewhat thorny one for the Midland. In 1878–80 there were four different forms of brake in use—(1) Westinghouse, (2) Smith's simple vacuum, (3) Sanders and Bolitho's automatic vacuum, and (4) Barker's hydraulic brake.

The Midland was almost the first railway

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in this country to use continuous brakes, and, as I have already mentioned, they worked a local train between Leeds and Bradford in 1873, which was fitted with the Westinghouse brake. I believe that the Pullman car trains also had this brake, and it appeared extremely likely at one time (1879–80) that the Westinghouse would be adopted generally. Had the Midland taken this step, there is very little doubt but that this would have become the standard brake on all railways. The Midland staff, however, set to work to improve the Sanders & Bolitho brake, from which the present automatic vacuum was evolved, and naturally took more interest in their own pet projects than they did in the Westinghouse, which, I am afraid, was looked upon as an American interloper. At any rate there resulted a good deal of friction between the Midland engineers and the Westinghouse Brake Company. At one time or another more than 100 Midland passenger express engines were provided with Westinghouse air pumps, although there were never more than about 60 engines so fitted at the same time, for the locomotive department used the same pumps and moved them from one engine to another. All the Midland Scotch trains and their connections were so fitted, for both the North British and the Glasgow and South Western Railways were "Westinghouse" railways. The North British remained faithful to the Westinghouse, but the Glasgow and South Western Railway, which had the same chairman and a more intimate connection with the Midland, seceded in the later "eighties" to the automatic vacuum. There then had to be arrangements for combined brakes, *i.e.*, the coaches were "dual fitted" with both brakes, the blocks being actuated by either, according to the fitting of the engine attached to the train. By 1889, the Westinghouse disappeared from the Midland. The Glasgow portions of the Scotch expresses, which were by this time often worked throughout as separate trains, became "automatic vacuum" trains, and the Edinburgh expresses had coaches supplied with the combined brakes.

Smith's simple vacuum brake, so long used on the Great Northern and Manchester, Sheffield and Lincolnshire Railways, was also used by the Midland on their London—Manchester and Liverpool expresses from about 1877 to 1882, and there were 54 express engines used entirely on this route with this brake. These were 1282 to 1301, and the 4-4-0 engines, 1312 to 1321 and 1327 to 1340. This form of brake, being non-automatic, was, however, doomed by the reports of the Board of Trade inspectors, who were strongly advocating automatic brakes.

The Sanders and Bolitho automatic vacuum brake was, as far as my recollection goes, first fitted to No. 170, a Beyer Peacock 2-4-0 engine, and a local train between Bradford and Leeds in 1878. I cannot, at the moment, call to mind the form of the original brake pipe connections, but most vacuum brakes of that day had two pipes with male and female couplings. Mr. Clayton, the carriage superintendent of the Midland, then set to work and produced the present universal brake pipe coupling now used on all railways, and it is this detail which, in my opinion, has contributed as much as anything to the general adoption of the automatic vacuum. So long as there was the clumsy arrangement of double pipes, the vacuum brake was at a great disadvantage as compared with the Westinghouse with its single pipe. Nevertheless, in its earlier years the automatic vacuum brake left much to be desired, and for some time the Westinghouse was undoubtedly the better brake of the two.

A third set of expresses came into being in 1880, fitted with the automatic vacuum, viz., the London—Bradford trains (known as the "John Nobles"), which ran *via* Nottingham; and also some of the Bradford and Newcastle to Bristol expresses, and from these the use of this brake gradually spread to all trains. I may add that the Sanders and Bolitho brake was adopted by the Great Western Railway at about the same time as the Midland.

Nothing much need be said about the fourth form of continuous brake used on the Midland. This was Barker's hydraulic brake, and as far as I remember was fitted only to two local trains which were worked between Bedford and St. Pancras by the 2-4-0 engines, 132 and 135. I do not think it lasted longer than 1880, and suffered from the defect of sometimes freezing up in winter.

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Before dealing with the improvements in the train services after 1881, something may be said of the Midland Railway in the Manchester district. Originally the Midland expresses ran into the Manchester, Sheffield and Lincolnshire Station at London Road, and from Marple took the circuitous route *via* Hyde and Guide Bridge. Then a direct joint line was made from Romiley to Ashburys Junction *via* Reddish, the route still used by the Midland goods trains to Manchester (Ancoats). This considerably shortened the distance from Marple, and was the passenger route used for a number of years. It was usual for the Liverpool portion to be in the front of the train, and the express engine from Derby took this portion on from Marple to Liverpool *via* Stockport.

In 1881, the Midland made a great improvement at Manchester by opening a new line from Heaton Mersey Junction on the Cheshire Lines near Stockport to Throstle Nest Junction, near Manchester (Central), also on the Cheshire Lines Railways, and the main line expresses were then diverted from London Road Station to Central Station. From this date the Manchester 4-4-0 express engines of the 1327 to 1340 class took up the main line work to Leicester, and very few Liverpool engines ran beyond Stockport. Most of the Liverpool expresses were for some time afterwards worked by Midland engines to and from Manchester (Central). A local service was also worked from Central Station through Stockport to London Road Station, and for this purpose new 0-4-4 tank engines, 1532 class, with 5 ft. 3 in. wheels and 17 in. by 24 in. cylinders were specially built at Derby. The 1532 class became the Midland standard tank engines; they had a larger water capacity (1,150 gallons) than the previous 1252 class.

In 1883, the best Midland Manchester express was given by Foxwell as follows:—

Miles.			p.m.	Speed, m.p.h.
—	Manchester (Central)	dep.	3.45	40
31¼	Miller's Dale	arr.	4.32	
		dep.	4.35	45¾
62¼	Derby	arr.	5.16	
		dep.	5.21	46⅝
92	Leicester	arr.	5.59	

Miles.			p.m.	Speed, m.p.h.
		dep.	6.4	48
141½	Bedford	arr.	7.6	
		dep.	7.10	45
161	Luton	arr.	7.36	
		dep.	7.37	47½
189½	Kentish Town	arr.	8.13	
		dep.	8.16	
191¼	St. Pancras	arr.	8.20	

A few years afterwards, important accelerations took place which will be mentioned later.

Something may now be said as to the line from Derby to Bristol. Before the summer of 1880 the west expresses from Derby stopped at Saltley, and from here the engine proceeded to Birmingham (New Street) with the front portion of the train. New Street was then a terminus, so far as Midland trains were concerned. The rear portion of the train, which consisted chiefly of the Bradford—Bristol coaches, had a local engine attached, and was forwarded up the "Aston Curve" bank to Camp Hill or King's Norton, where it was taken in hand by the Birmingham to Bristol train which came out from New Street *via* Gloucester Junction signal box to Camp Hill. A stop of a few seconds was made at Blackwell at the top of the Lickey incline, and a longer one at Bromsgrove, whence the train travelled *via* Worcester. Gloucester was then a dead-end terminal station into which the trains from Birmingham ran, and after the station work had been performed, they backed out to Tramway Junction, and restarted for Bristol.

The expresses between Birmingham and Bristol, until 1880, were worked by the unrebuilt 800 class, Nos. 820 to 829, stationed at Bristol, and at the Birmingham end, Saltley shed supplied 90 to 92, 95, and 120 to 128, of the 890 class. Particulars of all these engines have been given in the earlier portion of this article. In 1879–80 these engines were replaced by 1282 to 1296, 6 ft. 6 in. coupled 2-4-0 at Bristol, and 105 to 110, 7 ft. coupled, at Saltley.

The year 1880 may be truly said to have seen the birth of the modern Midland express service. The improvements on the London main line have already been mentioned, and the West of England line also came in for its share. Two new fast expresses left Bradford for Bristol at 7.50

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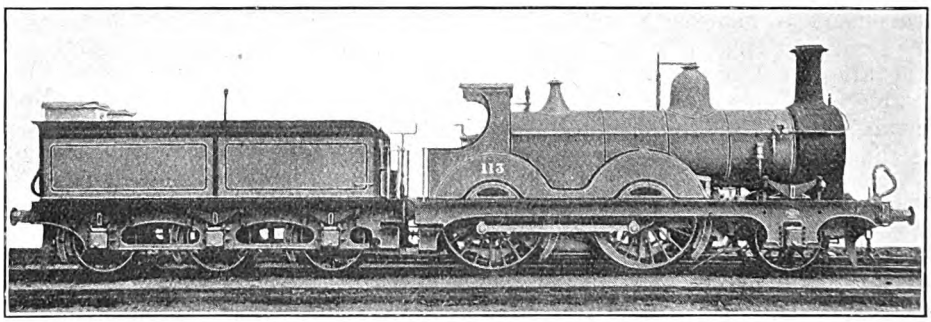
and 11.15 a.m., which were joined at Sheffield by coaches from Newcastle. From Saltley, the trains were run direct to Cheltenham *via* Dunhampstead, instead of taking the loop through Worcester. Although nominally non-stop runs, there were two stops of short duration at the top and the foot of the Lickey incline, but beyond Cheltenham, one of the trains cut out Gloucester altogether, and made Mangotsfield the next stop, in order to detach the through coaches from the north to Bournemouth. Between Derby and Bristol, the average time for these expresses was 3 hours 15 min. for the 130¾ miles, of which 14 min. were occupied with stops, giving a running average of 43⅓ m.p.h. On October 1, 1885, all the expresses were diverted from the old Camp Hill route to Leeds, but the Bristol engines did not run north of Birmingham. The slow train service west of Birmingham was in the hands of the rebuilt Beyer Peacock 2-4-0 engines, 180 to 188, at Gloucester, and 189 to 192, stationed at Worcester.

The following is a good average sample of the actual everyday locomotive performances :—

ENGINE No. 1299 (NOW No. 174); 6 FT. 6 IN.; 2-4-0, CYLINDERS 17½ IN. BY 26 IN.; LOAD ABOUT 130 TONS.

	h.	m.	s.	Speed, m.p.h.
Birmingham dep.	3	14	42	(due 3.12)
Post 7	3	25	37	—
,, 8	3	26	55	46·1
,, 9	3	28	11	47·4
,, 10	3	29	32	44·4
,, 11	0	30	46	48·6
,, 12	3	31	57	50·7



2-4-0 ENGINE NO. 113 (SERIES 111-115). BUILT AT DERBY, 1880.

Coupled wheels, 6 ft. 6 in. diam. Cylinders, 18 in. by 26 in. Steam pressure, 140 lb. per sq. in.

the new line from King's Norton to Birmingham (New Street) *via* Selly Oak, and for the first time Birmingham was placed on the main line, and New Street ceased to be a Midland terminus. The locomotive working was, between 1881 and 1885, usually arranged for the Leeds engines (1502 class) to run to Derby, though, in the case of the first morning express, the York engines (56 class) took the train from Sheffield to Derby. Between Derby and Saltley, the engines stationed at both these sheds worked the trains, which were then handed over to Saltley and Bristol men who completed the journey.

After the 1885 change, it became usual for the Leeds and Normanton men to run several trains through to Birmingham. The Birmingham engines had one turn to

Blackwell ..	arr.	3	33	20	—
	dep.	3	33	35	—
Bromsgrove..	arr.	3	38	18	—
	dep.	3	38	24	—
Post 17	3	42	0	—	
,, 18	3	43	10	51·4	
,, 19	3	44	15	55·4	
,, 20	3	45	20	55·4	
,, 21	3	46	25	55·4	
,, 22	3	47	31	54·5	
,, 23	3	48	39	52·9	
,, 24	3	49	46	53·7	
,, 25	3	50	53	53·7	
,, 26	3	52	0	53·7	
,, 27	3	53	5	55·4	
,, 28	3	54	10	55·4	
,, 29	3	55	17	53·7	
,, 30	3	56	20	57·1	
,, 31	3	57	21	59·0	
,, 32	3	58	23	58·0	
,, 33	3	59	23	60·0	
,, 34	4	0	25	58·0	
,, 35	4	1	30	55·4	
,, 36	4	2	36	54·5	
,, 37	4	3	46	51·4	

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		h.	m.	s.	Speed. m.p.h.
Post 38		4	4	55	52·2
,, 39		4	6	0	55·4
,, 40		4	7	5	55·4
,, 41		4	8	12	53·7
,, 42		4	9	24	50·0
,, 43		4	10	39	48·0
,, 44		4	11	56	46·7
,, 45		4	13	16	45·0
,, 46		4	14	44	40·9
Cheltenham ..	arr.	4	15	30	(due 4.16)
	dep.	4	19	37	(due 4.20)
Post 48		4	23	16	—
,, 49		4	24	31	48·0
,, 50		4	25	39	52·9
,, 51		4	26	42	47·1
,, 52		4	27	46	55·2
Slack round Gloucester curve.					
Post 36		4	30	52	—
,, 35		4	32	32	36·0
,, 34		4	33	52	45·0
,, 33		4	35	8	47·4
,, 32		4	36	27	45·6
,, 31		4	37	44	46·7
,, 30		4	39	0	47·4
,, 29		4	40	7	53·7
,, 28		4	41	10	57·1
,, 27		4	42	12	58·0
,, 26		4	43	15	57·1
,, 25		4	44	17	58·0
,, 24		4	45	18	59 0
,, 23		4	46	21	57·1
,, 22		4	47	27	54·5
,, 21		4	48	32	55·4
,, 20		4	49	37	55·4
,, 19		4	50	45	52·9
,, 18		4	51	57	50·0
,, 17		4	53	17	45·0
,, 16		4	54	41	42·8
,, 15		4	56	12	39·6
Mangotsfield	arr.	5	9	0	(due 5.9)

It will be seen that although there is nothing remarkable in the run, time was gained. The record was made before the alteration to the Midland mileposts. Beyond Gloucester the old posts indicated the distances from Bristol.

But frequently I found that the trains, especially when late, ran at much higher speeds. Engine 1338, 7 ft. 4-4-0, ran from Cheltenham to Birmingham with a fairly heavy load of 180 tons, and attained 65½ m.p.h. for several miles before reaching Bromsgrove.

In an earlier portion of this article I have recorded how ¼ mile of the main line was lost, and this, as far as I know, was never found again. Other important items of railway property occasionally came under the heading of "Lost, Stolen, or Strayed," and on one occasion in the early eighties a Midland locomotive disappeared for a time. It was one of the 800 class, No. 805, then stationed at Kentish Town, and one fine morning it started out from St. Pancras with a "special" for Northampton. On its arrival there, there was a sudden call for an engine to work a special goods train of boots or other "perishables"—destination, Wigston. I am not sure as to the exact sequence of the subsequent movements of the engine, but they were somewhat after the following manner. The Northampton locomotive people had a good deal of frail human nature embodied in their make-up, and as 805 did not belong to them and they were hard up for engines, it was promptly requisitioned for the boots, with a fresh set of men. The London men returned home by train, taking their own head lamps which denoted the station of the engine, for in those days each Midland driver had his own set of lamps with his name and shed painted on them. There seems to have been an epidemic of special trains on that day, for no sooner had the engine turned up at Wigston than it was commandeered for a special goods to Birmingham. Eventually, it wandered to Bristol, who sent it back to Gloucester, and the locomotive people at the latter shed, not knowing to which station it belonged, put it into a siding behind some coal wagons pending enquiries, and then proceeded to forget all about it.

A day or two later, Kentish Town found they were minus an important engine, and made enquiries from Northampton, who promptly communicated with Wigston, &c., &c. The correspondence grew rapidly in volume on the snowball system, but there was a hitch somewhere, as somebody had omitted to record one of the chess-board moves made by the engine, so that at the return of stock at the end of the month the engine was reported as missing. A circular letter to all the locomotive depôts on the line resulted in the eventual discovery of 805, grazing peacefully in the Gloucester siding, but it was some time before Kentish Town saw its long lost engine again.

At about this period the Midland came to the conclusion that there were too many private owners' wagons on the line, as these necessitated a lot of train mileage in returning the empty wagons to the owning collieries and iron-works. So the railway company set about purchasing these wagons. As far as my personal recollections went, I doubt whether the original idea succeeded, at least to that

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extent which its advocates had desired. For when they had sold their wagons to the railway company, the private owners invested the proceeds of the deal in new wagons, so that things remained pretty much as they were before. The lettering of goods wagons by means of large letters, "MR" on the sides—a plan since adopted by all companies—owes its origin to this purchase, for all the wagons so bought were the first to have these large initials on the sides, and eventually, some years later, the company lettered all their wagons in the same way, and their example has since been copied by other railways.

This question of wagons was one, however, that interested the traffic department. The traffic department, from the point of view of the average locomotive department, is a necessary nuisance whose vagaries have to be put up with. On the other hand the traffic people sometimes hold peculiar and forcible views on the subject of the locomotive authorities. One of the brighter features (I write as an old locomotive man) of the Midland traffic department of the "eighties" was a certain station master, a martinet who ruled supreme at one of the intermediate stations north of Leeds, where tickets were collected on certain of the fast trains. His "*bête noire*" was the season ticket holder, and woe betided the unlucky individual who had left his "season" at home, for Mr. Stationmaster carefully and minutely examined all "seasons" every day. On one well-known occasion Mrs. Stationmaster went marketing in Bradford, and on returning, in an absent-minded way, got into a first-class compartment with a third-class ticket. On arrival at her destination the door was opened by her spouse, who duly recorded her name and address and formally reported the matter to Derby.

I knew the old fellow well, and after some twelve months or so of pitched battles on the season ticket and other burning questions, we mutually patched up a sort of working agreement, and got on fairly well afterwards. One day he seemed unusually communicative on the subject of a certain Mr. —— and his family, who lived in the neighbourhood, and had gone away for a holiday. "Gone yatcheting, I hear," said Mr. Stationmaster with a tentative note of interrogation in his voice. "Gone what?" I said, sinking back into the nearest seat, just as the up Scotch express thundered through, and in my astonishment I omitted to notice the engine for about the first time within my experience. "Gone yatcheting," he repeated somewhat testily. "It's plain English I should think." Nevertheless, I had my doubts as to this; but—suddenly remembering that I had left my "season" at home, I thought it wiser not to pursue any further researches into Greek or other idioms. The sequel leaked out by degrees, and was a source of great joy in the district. Mr. —— and his family had gone on a yachting cruise, and had shut up the house, and just after his departure a very thoughtful friend had sent him a present of a fine goose, which duly arrived at —— station. It lay for some hours in that portion of the booking-cum-stationmaster's office devoted to parcels, until Mr. Stationmaster's mouth watered so much that he could stand the strain no longer. Purely as a matter of form the goose was sent up in charge of a porter to the closed house and duly brought back again to the station. Then a carefully-worded communication was despatched to Derby, giving a most harrowing description of a "parcel"—a bird hopelessly in the throes of incipient decomposition—with an urgent enquiry for immediate instructions as to its disposal. A wire was duly received in reply, which contained, so report said, permission to bury the bird, and Mr. Stationmaster "buried" it. I am unable to indicate definitely the exact site of its interment, but from collateral evidence diligently collected with much care by a committee consisting of the junior porter and a somewhat inquisitive booking clerk, it was concluded by the inhabitants of the surrounding district that the bird had found a resting place "somewhere in stationmaster." Even the members of a traffic department have their bright side.

(*To be continued.*)

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The WHY and the WHEREFORE

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which was published in April, 1919, price 5s. net, by post 5s. 6d. This edition is nearly out of print but a new one is in preparation, in readiness for publication in April, 1920.*

"V" Class "Atlantic" Locomotives, North Eastern Railway.

These were among the earliest to be built of the very heavy express locomotives now commonly in use in the British Isles, and we believe that the main frames of the first series of ten engines suffered somewhat from sagging owing to being insufficient in depth. This defect was remedied in the second series (Engines Nos. 696–705) by a suitable strengthening of the frames, which we understand has been subsequently carried out on the original engines also. Both series are officially classified as "V," there being no "VI" class. We should not be inclined, by ordinary standards of performance, to describe the original series of "V" class engines as very successful in working, but the second series, with cylinders reduced in diameter from 20 in. to 19½ in., has done better work, and all 20 engines have derived considerable benefit from their recent superheating. There is no question, however, as to Sir Vincent Raven's more modern series of 50 3-cylinder 4-4-2 engines of Class Z having given more satisfaction in every way than the pioneer N.E. "Atlantics" of Class V.

[Reply to Professeur A. FROMENT.]

Swansea Avoiding Lines, Great Western Railway.

We have no doubt that the final section of these lines, from Morlais Junction (Llangennech) to Pembrey, will be proceeded with as soon as conditions render it possible, and should Fishguard become again a port of call for Transatlantic steamers, this will almost certainly become the route followed by the connecting express trains, as it will ultimately be shorter than the old main line and comparatively free from service slacks, while the ruling grade is 1 in 120 throughout, against the 1 in 50 of Cockett bank. On the other hand, the Irish boat expresses are not likely to use the new route, as by calling at Landore they serve the important town of Swansea. Service slacks on the new route are 40 m.p.h. at Court Sart Junction, and 30 over Neath River bridge; 50 at Morlais East Junction and 40 at Llandilo Junction, with 40-50 m.p.h. over certain curves between the two last-mentioned points. On the old route 35-40 m.p.h. is required for ½ mile through Neath, and 20 m.p.h. for ½-mile over Landore viaduct and through the station.

[Reply to R. P. ANGUS-LEWIS.]

Maximum Speeds.

Highest speeds on the London, Tilbury and Southend section of the Midland Railway are usually attained on the down journey between Laindon and Pitsea, and on the up journey between Laindon and Upminster, in the case of non-stopping trains. The best maximum rates recorded by Mr. Cecil J. Allen in his "British

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Locomotive Practice and Performance" articles have been 61 m.p.h. in the former case, and 67 in the latter (*see* February issue, 1917, page 116). Doubtless these speeds have been exceeded at times, but they are fairly representative of pre-war running on the best trains. At the present time, on war schedules, we doubt if the mile-a-minute rate is often reached on this route. You must disabuse your mind of the idea that the same train always attains the same speed at the same spot. Maximum speeds are dependent on engine, driver, load, weather, and other factors, as you cannot fail to see by reading the articles just referred to.

[Reply to "L.T. and S."]

"Support the Local Lines."

In reply to your query under above heading we have to say that the four railways mentioned by you, viz., Kent and East Sussex, East Kent, Shropshire and Montgomeryshire, Weston Clevedon and Portishead, are all owned by separate companies, each with its own board of directors, but being small lines, for the purpose of economy, their administrative work is centred in one office at Tonbridge, Kent. Lt.-Col. H. F. Stephens, who in addition to his skill in civil and mechanical engineering, possesses the faculty of successful railway management to a remarkable degree, administers them with the aid of a central staff. Lt.-Col. Stephens is also connected with several other small lines. As to your second question, the milk van belonging to the Weston Clevedon and Portishead Railway on loan to the Shropshire and Montgomeryshire Railway is only lent as a temporary measure.

[Reply to "W. H. ROBINS."]

Shap Summit, London and North Western Railway.

Gradients over Shap Summit in reality cover the whole 63 miles between Carnforth and Carlisle, between which points the summit point is exactly midway, and we cannot afford the space to enumerate them here. In the October, 1913, issue a complete profile of the Lancaster-Carlisle section of the London and North Western Railway was given, and to this we must refer you. In view of the intermediate gradients, *with the same load*, an average of 45 m.p.h. between Crewe and Carlisle would probably be about equal in difficulty to one of 50 m.p.h. between Crewe and London. The fastest pre-war non-stop schedule over the Northern section was one of 159 min. for the 141 miles from Crewe to Carlisle, equal to 53.2 m.p.h., by the Glasgow portion of the 10 a.m. from Euston.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

Midland Railway History.

In the summer of 1868 the Midland trains ran each way over the Great Northern Railway between King's Cross and Hitchin. Of these, four down and four up called only at Hitchin; the others running through that station. No up Midland trains stopped at Holloway for tickets and, presumably, tickets were collected at Hitchin (in the case of trains calling there) or at the last stopping place on the Midland line. These trains occupied from 42 to 50 min. between London and Hitchin. There were approximately the same number of Great Northern Railway expresses with timings similar to those mentioned. At this period a four-track road existed from the north end of Copenhagen tunnel to Finsbury Park, and also through Hitchin station. Midland trains ceased to run between King's Cross and Hitchin after September 30, 1868.

[Reply to Captain G. CULLIS.]

Revised National Code of Headlights.

Descriptions given on page 45 of the RAILWAY YEAR BOOK of the new classifications are those officially issued. We take it that codes H and J correspond jointly to the old "Through goods" indication (three white lights along buffer-beam), a distinction being now made between through goods trains making certain intermediate stops for traffic purposes (J), and those stopping only for locomotive purposes or examination (H). There has been no general revision of bell signals, the only new signal being 3-4-1 for trains of class J. During the war period we believe the only trains subject to special indications were those conveying Government stores. Troops and ambulance trains travelled, as required, under express or ordinary passenger headlights.

[Reply to Captain G. CULLIS.]

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Side-Window Cabs.

Cabs with side-windows are now standard in new locomotive construction on the North Eastern, North British and Great Eastern Railways. The underlying idea is that of enlarging the cab space, and affording better protection against bad weather, while at the same time providing ample light and ventilation, and this type of cab, which is universal in almost every country but this, has always been greatly appreciated by the men generally wherever introduced.

The particular engines so fitted on the South Eastern and Chatham Railway, to which you refer, were originally intended for the Great North of Scotland Railway, but were taken over from the builders by the former company at a time of locomotive shortage. Your other query has already been answered at length in a previous issue.

[Reply to "CANTUAR."]

Superheated "Atlantic" Engines, North British Railway.

Dimensions of these engines are the same as the non-superheater "Atlantics," except that the cylinders are now 21-in. diameter, instead of 20-in., and the total weight of engine in working order is increased from 74 tons, 8 cwt. to 76 tons, 14 cwt. On this account, as a Glasgow reader points out, these engines are now the heaviest express engines in Scotland, exceeding the weight of the Caledonian "60" class 4-6-0s. by 1¾ tons. Numbers and names of the superheated "Atlantics" have been given from time to time in the "What the Railways are Doing" pages, to which we must refer you.

[Reply to "TAY BRIDGE."]

A Midland Railway (London, Tilbury and Southend Section) Query.

Doubtless your query refers to the single line branch which connects Upminster, on the direct Southend line, through Ockendon with Grays, on the Tilbury line. This, with its extension from Upminster to Romford, is the only length of single line on the London, Tilbury and Southend section of the Midland Railway. As regards the other point in your letter, the Hull and Barnsley Railway has never worked into York, and London and North Western engines are now only seen there specially; you are, therefore, wrong in your conclusions.

[Reply to "ESSEX."]

Condensing Locomotives: Midland Railway (London, Tilbury and Southend Section).

Particulars given in the RAILWAY MAGAZINE, October, 1918, were correct at the time of publication. We are now informed, however, that three of the four engines have had the condensing gear removed, and are painted standard Midland colours, though retaining the rounded cab roof, while the fourth will be similarly dealt with in due course. The photograph you have of No. 29 (now 2138) shows it before alteration. These four engines belong to the 1—36 series, but as far as we are aware no others have rounded cab roofs.

[Reply to "D. R."]

Watford-Broad Street Electric Service.

You appear to overlook the fact that a service of London and North Western Electric trains is running at the present time, viz., four Watford to Broad Street in the morning, and five Broad Street to Watford in the evening. These trains travel *via* the Hampstead Junction Line, which can only take a limited number, but the route of the regular electric service when the new lines are complete will be *via* Chalk Farm and Loudoun Road. The work on this section of the electrified lines was stopped about two years ago by Government order, but is about to commence again.

[Reply to "NORTHERNER."]

"Biggest Engines.

As we have so often stated previously in this connection, "biggest" is a vague term, but it could doubtless be claimed on the two lines to which you refer, by the 4-6-0 4-cylinder "Claughton" class as regards the London and North Western Railway, and the 4-6-2 express engine No. 111, *The Great Bear* on the Great Western Railway. Your second query has been frequently answered in these columns, and we must refer you to past issues, or to "Railway Miscellany" in the RAILWAY YEAR BOOK, page 356.

[Reply to "G. K. KING."]

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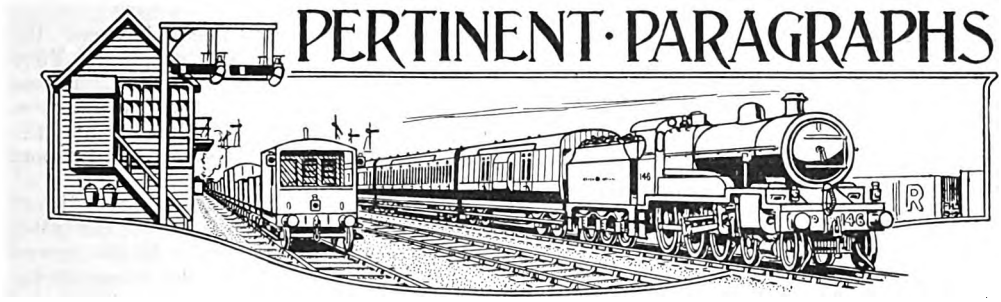

PERTINENT·PARAGRAPHS

Our Frontispiece.

FOR the original photograph from which the frontispiece to this issue has been produced the RAILWAY MAGAZINE is indebted to Mr. C. Cumming, Locomotive, Carriage and Wagon Superintendent, Highland Railway.

Four engines of the new 4-6-0 "Clan" class have recently been delivered to the Highland Railway by the builders, Messrs. R. and W. Hawthorn Leslie and Co., Ltd., Newcastle-on-Tyne. The locomotives are Nos. 49 *Clan Campbell*; 51, *Clan Fraser*; 52, *Clan Munro*, and 53, *Clan Stewart*. Our frontispiece illustrates No. 51, *Clan Fraser*.

These locomotives are intended principally for the working of heavy passenger trains between Inverness and Perth. They are equipped with the Robinson Superheater, Walschaert valve gear, inside admission piston valves, and the fire-box is of Belpaire type. Each engine is also fitted with the Wakefield Mechanical lubricator for valves, pistons, etc., and engine (except bogie) and tender wheel bearings are fitted with Iracier boxes.

Leading dimensions are :—

Cylinders, diameter ..	21 in.
Pistons stroke	26 in.
Coupled wheels, diameter ..	6 ft.
Bogie wheels, diameter ..	3 ft.
Wheel base, rigid	14 ft.
Wheel base, engine and tender	50 ft.
Length of engine and tender over buffers	59 ft. 3 in.
Boiler pressure	170 lbs. per sq. in.
Heating surface tubes ..	919 sq. ft.
Superheater smoke tubes ..	409 sq. ft.
Fire-box	139 sq. ft.
Total	1,467 sq. ft.

Of the six-wheeled pattern, the tender has a water capacity of 3,500 gallons, and a coal capacity of 7 tons.

Weight of the engine and tender in working order, as will be seen by the particulars on the frontispiece, is 104 tons 6½ cwt.

A Supreme Traffic Board for London.

THE report issued by the Committee of the House of Commons (Mr. H. Kennedy Jones, chairman), appointed to investigate the congestion in the existing means of transport in the Metropolitan area, together with the question of fares, includes the following main recommendations :—

1. The immediate creation of a Supreme Traffic Board for Greater London. (Radius—Metropolitan Police area; membership—five, as a maximum; powers—all those now possessed by existing bodies or conferable by statute; authority—executive, with right to delegate where desired; special functions—to co-ordinate routes and services of all systems of transport; regulate all traffic and street repairs, be responsible for the comfort and convenience of the public, provide for future developments, and promote legislation to desired ends.)

2. While some increase was inevitable, in view of post-war conditions, the new fares are in cases excessive, in others unjust, and too manipulated to be understood by the public. Greater uniformity is essential, and anomalies must be eliminated. The policies entailing such increases are open to criticism. The fares for taxi-cabs should be raised to 1s. for the first mile, with 3d. for each subsequent quarter of a mile. Increased fares outside the central area.

The suggested composition of the proposed board is five members as a maximum, to be appointed by the Government from nominations submitted by the Home Office (one); Ministry of Ways and Communications (one); London County Council (one); local authorities outside the Administrative County of London (one); with an independent chairman to be appointed by the Government.

An "Underground" Statement.

The report, as a whole, includes various features of interest, and, in many respects offers ground for real usefulness. It does not, however, satisfy all the factors in the situation, and is open to criticism in many ways. Following publication of this report, a statement was issued on behalf of the "Underground" group of transport companies. The following items may be extracted therefrom :—

"We have read the report. It makes

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many allegations, but all of a general character, and advances no specific evidence in support of them. It is, therefore, quite impossible to furnish a specific answer. It will, we think, be seen, when the evidence taken by the Committee is published, that many of the allegations cannot be supported by the facts given. They would rather appear to rest upon the opinions and impressions of certain members of the Committee.

"On the question of fares the report itself supplies the answer to the allegation that the Underground Group of Companies has made unreasonable increases. The average dividend on the capital employed is stated, on page 7 of the report, to be 2.93 per cent., and, on page 11, it is accepted that 'actual capital is entitled to a reasonable return on its outlay.' Surely, less than 3 per cent. is not a reasonable return.

"The primary recommendation of a Central controlling authority for London traffic is a right and proper thing, and has always been supported by the Underground Group of Companies. The exact form of that controlling authority, as recommended by the Committee, is open to manifest objection. In particular, the L.C.C., as the body responsible for the actual conduct of the tramway system in London proper, is hardly entitled to sit in judgment upon traffic questions. The Underground Group of Companies has, however, no definite scheme of its own for a traffic board, and would accept any independent and impartial tribunal."

The Transport Department of the Ministry of Food.

DURING the war period the food problem constituted a big issue in the successful conduct of affairs, and, in view of the important part played by the railway companies in regard to both food distribution and storage, reference to the work of the Transport Department of the Ministry of Food will be in order.

The Director (who is also a member of the Road Transport Board) is Mr. G. J. Gibson, Traffic Manager of the Manchester, Sheffield and Nottingham section of the Great Central Railway, and formerly with the London and South Western Railway. The staff is composed of officers loaned by various railways, retired railway officials, and others experienced in transport questions. With headquarters in Westminster, organisation extends over the whole of Great Britain, officers being stationed in the principal towns and at various ports in England, Scotland and Wales. The Director and Headquarters Staff of the Transport Branch are closely in touch with all sections of the Food Ministry, and act as *liaison* officers between the Ministry and the Railway Executive. They also keep in daily touch with the Divisional Transport officers who, in their turn, act as *liaison* officers between the Ministry and the railways, canals, shipping and road transport agencies.

The General Storage Section is an adjunct to the Transport Branch. Whilst the latter is instrumental in getting foodstuffs moved quickly, it is the former's task to assist the various sections to obtain storage, this being a matter of no little complexity, owing to the paucity of suitable accommodation. Periodical conferences are held at headquarters, divisional officers from all parts of the country attending to discuss matters of moment.

At one of these conferences recently held, the Right Hon. G. H. Roberts, M.P., Food Controller, in the course of his remarks, said: "I would just like to say how immensely indebted we are to the railway companies. Whilst at the Board of Trade it was my privilege to come into very intimate contact with the leaders of the railway world, and I am free to acknowledge that at least the railways of this country are one of the institutions which have succeeded in attracting to its service some of the finest brains and loftiest characters of our period, and it was a source of profound gratification to me to be able to work with them. Therefore, we are deeply indebted to you and to the railway companies for the services rendered. I think you will find that we will have to make very heavy drafts upon your knowledge and upon your experience. The transport problem is one very closely associated with the question of food supply. We have been greatly exercised about the tonnage question, but we are now advised that that, after all, is not our most urgent problem, because even when we have succeeded in transporting supplies across the seas, the greater difficulty is encountered here in landing them because of labour and other difficulties, which increase the task of clearing the ports and conveying goods to their proper destination."

The late Mr. Frank Potter: General Manager, Great Western Railway, 1912–1919.

ALTHOUGH he had figured less prominently before the general public than have some of his colleagues and predecessors, the name of the late Mr. Frank Potter, General Manager, Great Western Railway, was associated with a rise to eminence by sheer ability and hard work. He was popular, because he was essentially a staff man; his ability was unquestioned, because he had "been through the mill" himself; and he enjoyed the con-

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fidence of the directors, of his officers, and o men of every grade in the service. His seven years of general managership covered the whole of the war period, and no general manager was a more regular attendant or took a more active part in the meetings and work of the Railway Executive Committee. He was a fluent speaker, and his knowledge of every detail affecting the great railway which he represented was the frequent admiration of his colleagues. But for his great modesty his work would have received public recognition. There is no doubt that the constant strain of the past five years considerably shortened his life.

Elliott] THE LATE MR. FRANK POTTER. [*& Fry.*

General Manager, Great Western Railway, 1912–19.

Mr. Potter was born on March 30, 1856, and educated at Cranford Hall School, near Hounslow. He entered the service of the Great Western Railway in 1869, being attached to the goods department at Paddington, where he was associated with the accounts and cartage section of the Goods Superintendent's Office. In 1877 he was promoted to the General Manager's Office. In 1881 Mr. Potter was transferred to the Traffic Department, and was engaged for a time at Windsor, subsequently becoming stationmaster at several provincial stations. In 1888 he was appointed chief clerk in the office of the London Divisional Superintendent, and in that capacity not only took a prominent part in connection with the working of the railway, but was for a time actually —though not nominally—in charge of the London Division. In 1894, considerable changes took place, and Mr. Potter again found himself a member of the personal staff of the General Manager. Sir Joseph Wilkinson's appointment as General Manager of the Great Western Railway in 1896, in succession to Mr. Lambert, secured further advancement for the subject of our notice, while less than 12 months after Sir Joseph Wilkinson's death and Sir James Inglis

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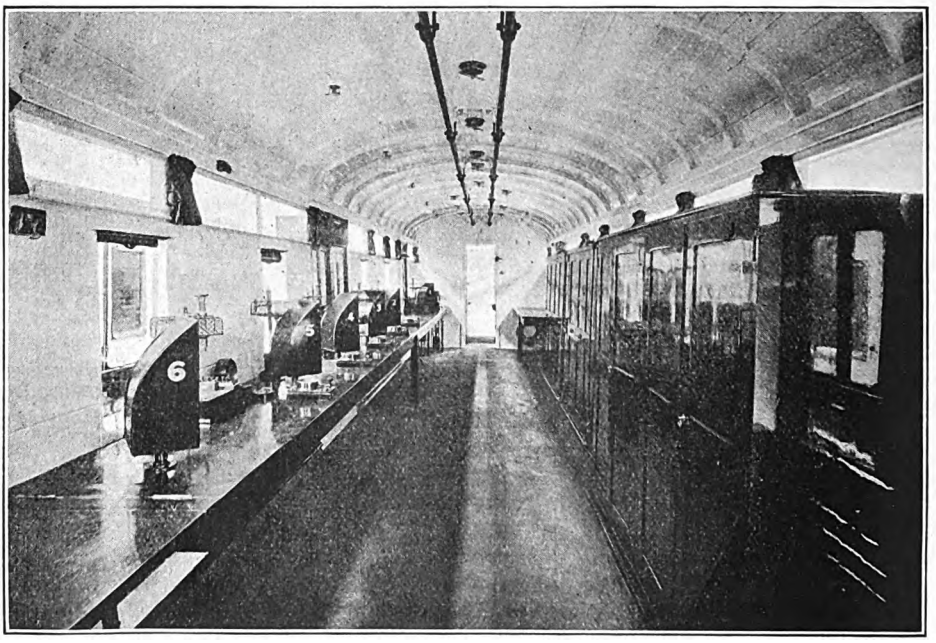
appointment to succeed him, Mr. Potter became Chief Assistant to the General Manager. In 1912, consequent upon the death of Sir James Inglis, Mr. Potter was appointed by the directors to the position of General Manager. Mr. Potter was a member of the Railway Executive Committee. In 1916 he was elected Chairman of the General Managers' Conference of the Railway Clearing House.

The funeral took place on Saturday, July 26, at West Drayton, and was private, being attended by relatives, personal friends, and the chairman and a few of the chief officers of the Great Western Railway. At noon the same day, a memorial service was held at St. James's Church, Paddington, which was largely attended.



SPECIAL TRAIN FOR THE COMMANDER-IN-CHIEF IN FRANCE.
Interior View of the Telegraph and Telephone Car.

Special Train for the Commander-in-Chief in France.

By the courtesy of Mr. A. R. Trevithick, Carriage Superintendent, London and North Western Railway, the RAILWAY MAGAZINE is enabled to describe the special train designed and built at the company's works to provide living accommodation for the Commander-in-Chief of the British Army and his staff in France.

On April 10, 1917, the London and North Western Railway was asked to provide a train of 10 vehicles for this purpose. Five coaches left Wolverton on May 5, and the remaining five on the 12th of the same month, so that the complete train of 10 vehicles was provided in a month from the date of the order. A further request for four additional vehicles was received later, and these were fitted up and sent out on July 20, 1917.

Coach No. 1 comprises a dressing-room, bedroom and sitting room for the Commander-in-Chief; No. 2 is a bedroom, bathroom and office for the Chief of Staff and his assistants; while Nos. 3, 4, 5 and 6 are cars giving sleeping and office accommodation generally. No. 6 has an assembly room, and this is placed next to the Officers' Mess Car, No. 7. No. 8 is the kitchen car, and this also contains the electric lighting set and accumulator room. No. 9 is a car for officers' orderlies, servants, &c. No. 10 provides more sleeping accommodation, chiefly for junior officers. No. 11 gives a large office, and an officers' bed and bathroom. No. 12 is a telegraph and telephone vehicle. No. 13 is a stores van, and in this is fitted a small locomotive boiler for providing the steam to heat the train when standing, while No. 14 is an ordinary brake van for stores and other impedimenta.

With the exception of the telephone vehicle and the two brakes, the whole of the cars were converted from 42 ft. by 8 ft. 6 in.

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bogie picnic saloons taken from stock, and, so far as lights and doors were concerned, lent themselves very well to the scheme without much structural alteration.

The train is electrically lighted by a petrol driven lighting set, steam-heated by the locomotive when running and by a boiler fitted in the brake and stores car when standing, and is fitted with the Westinghouse brake. The telegraph and telephone car was fitted up with the necessary instruments lead colour. Ventilation has been studied, and there is an ample supply of fans and roof ventilators, while all the drop lights are fitted with louvres and gauze that can be used in the opening when lights are dropped.

Retirement of Mr. W. J. Grinling, Chief Traffic Manager, Great Northern Railway, 1902–1919.

MR. GRINLING comes of a well-known railway family, and joined the Great Northern

Elliot] MR. W. J. GRINLING. *[& Fry.*

Chief Traffic Manager, Great Northern Railway, 1902–1919.

&c., by the engineering staff of the General Post Office; but the vehicle itself and all furniture, counters, &c., were provided by the railway. There is telephone and bell communication throughout the train, and means are provided and cable carried on the telephone car for connecting up to any telegraph and telephone system in proximity to the train.

Interior painting is principally white enamel, while the exterior is finished off in

Railway service so long ago as October, 1871, at a time when his father, the late Mr. William Grinling, was Chief Accountant of the company. The united service of Mr. W. J. Grinling and his father thus extends back to 1849, covering the whole period since the Great Northern Railway was first opened for traffic. Mr. W. J. Grinling's own period of service dates from the time when Sir Henry Oakley had recently been appointed General Manager, and in 1894 he became Assistant

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to that gentleman, serving in that position for five years with Sir Henry Oakley and afterwards Mr. Charles Steel. In October, 1899, Mr. Grinling was appointed Chief Goods Manager. Mr. Grinling is the first Chief Traffic Manager of the Great Northern Railway, and was appointed to that office in April, 1902. He carried out the reorganisation of the Traffic Department, of which he has had full control ever since. For many years past he has appeared as a witness in most of the important cases before the Railway and Canal Commission, where his thorough grasp of traffic questions has always been highly valued. He has also frequently given evidence before Parliamentary Committees.

On Monday, July 28, in the Norfolk Room, Great Eastern Hotel, Liverpool Street, a dinner was given to Mr. W. J. Grinling, on his retirement, after having served nearly 50 years with the Great Northern Railway. Mr. C. H. Dent, General Manager, presided over a large gathering, which included chiefs of all the different sections of the railway, and, in presenting a silver tray to Mr. Grinling, paid him very eloquent and deserving tributes. Among officers who also tendered their congratulations and testimonies were Mr. Hill Dawe, Solicitor; Mr. E. Burrows, Secretary; Mr. Alexander Ross, late Chief Engineer; Mr. C. J. Selway, Superintendent of the Line; Mr. H. A. Ivatt, late Locomotive Engineer; and Mr. C. Lewis Edwards, Chief Accountant.

Ministry of Ways and Communications—Prospective Appointments.

In the course of his speech on the third reading of the Ministry of Ways and Communications Bill in the House of Commons, on July 10, Sir Eric Geddes, Minister-Designate, gave the following list of prospective heads of branches in the new Ministry to be formed under the Act:—

Civil Engineering.—Sir Alexander Gibb, K.B.E.

Consultant Mechanical Engineer.—Sir John A. F. Aspinall, President of the Institution of Civil Engineers, formerly General Manager, and now Director, Lancashire and Yorkshire Railway.

Mechanical Engineering.—Lieut.-Colonel L. Simpson, D.S.O., R.E., late Traction Superintendent, Buenos Ayres and Pacific Railway.

Traffic.—Sir Philip Nash, K.C.M.G., was Assistant General Manager, East Indian Railway and late Director-General of Transportation in France. Originally trained on the Great Northern Railway.

Statistics and Accounts.—Sir J. George Beharrell, D.S.O., late Assistant Goods Manager, North Eastern Railway.

Secretarial and Legal.—Sir Francis Dunnell, Secretary and Solicitor, North Eastern Railway.

Development.—Rear-Admiral Sir Charles Martin de Bartolome, K.C.M.G.

Public Safety and Labour.—Sir William Marwood, K.C.B., Joint Permanent Secretary, Board of Trade.

Roads Department.—Brigadier-General Sir Henry P. Maybury, K.C.M.G., Director of Roads under the Director-General of Transportation, France, now Manager and Secretary of the Road Board.

Subsequently it was announced that Mr. H. G. Burgess, Irish Traffic Manager, London and North Western Railway, had been selected for the office of Director of Irish Transport of the Ministry.

War-time Punctuality on the Midland Railway.

The following statistics concerning war-time punctuality on the Midland Railway are of special interest. In 1918 there were 24,164 express trains; of these, 17,637 were punctual and 3,376 not more than 5 mins. late, that is 87 per cent. of all express trains were either punctual or not more than 5 min. late. Out of a total of 388,617 local trains, 295,934 were punctual and 62,365 not more than 5 min. late, that is 92 per cent were either punctual or not more than 5 min. late. Out of 22,488 mineral trains passing Melton, where traffic from 11 coal centres converges, 8,215 passed that point to right time and 8,346 passed 1 to 10 min. late, or 73 per cent. of the total trains passing that point were either to right time or not more than 10 min. late. These most creditable results were obtained in spite of air-raids, fog, snow and the minor mishaps to which railways are liable.

A New Design of Motor Omnibus: L.G.O.C.

For some time the London General Omnibus Company has been preparing plans for an improved type of motor omnibus in which increased seating capacity and greater convenience are combined, and an experimental vehicle has now been completed. The vehicle comes within the dimensional limits imposed by the Commissioner of Police, but although accommodating 46 passengers, as compared with 34 in the usual type, is somewhat lighter, its unloaded weight being 3 tons, 9 cwt. 29 qrs., whereas the average for existing vehicles is 3 tons, 11 cwt. Increased seating capacity is obtained partly by placing the driver at the side of the engine, instead of behind it as usual, so that a greater length of body is practicable, but by adopting straight lines to the body more transverse space is afforded inside, and by a

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NEW TYPE OF MOTOR OMNIBUS: LONDON GENERAL OMNIBUS CO., LTD.

To seat 46 passengers as compared with 34 at present.

combination of transverse and longitudinal seats, accommodation is provided inside for no less than 22 passengers. On top there are 12 seats, each for two passengers. A special feature is the arrangement of the stairway at the rear. The platform is somewhat longer than usual, so that the steps by which passengers mount from the road afford room for two streams of passengers simultaneously. As a result inside and outside passengers can enter or alight independently of one another. The stairway itself is more freely designed, so that greater convenience results in regard to the movement of passengers. Inside the bus there are four brass pillars affording hand-holds to assist the movement of passengers and to accommodate standing passengers, as far as they are permitted. On either side are three electric lamps over the fanlights, so that good interior lighting is afforded. An electric bell is employed for signals, operated by the usual cord pull, and from the top by a push, the arrangement being one not hitherto adopted.

The engine is of the company's usual type of 30 h.p. at 1,000 revs., arranged, however, with the valves all on one side of the engine. A straight drive is fitted. The production of this new motor omnibus is of special interest in view of the existing traffic congestion, and when a number of the new 'buses are in service they should materially relieve the pressure.

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AMONG the names of recipients of "Birthday Honours" announced on August 12, occurs that of Mr. Alfred Waldron Smithers, J.P., M.P., who receives a knighthood. Sir Alfred Smithers has for some years been Chairman of the Grand Trunk Railway of Canada. He is also a director of the South Eastern Railway Company and a Member of the South Eastern and Chatham Managing Committee.

* * *

THE directors of the Great Western Railway have made the following appointments:—Mr. Charles Aldington, C.B.E., General Manager to the company in succession to the late Mr. Frank Potter; Mr. Felix J. C. Pole, formerly Assistant to the General Manager, appointed Assistant General Manager; Mr. F. W. Showers, formerly Rating Agent, appointed Assistant to the General Manager; Mr. J. H. Gallimore, District Goods Manager, Shrewsbury, to be District Goods Manager at Worcester, in place of Mr. A. H. Marshall, retired; Mr. W. J. Rich, District Goods Manager, Exeter, to be District Goods Manager at Shrewsbury; Mr. W. E. James, Assistant District Goods Manager, Swansea, to be District Goods Manager at Plymouth; Mr. R. J. Armstrong to be Divisional Locomotive Superintendent at Bristol, in place of Mr. W. Phillips, retired. Mr. L. B. Page is retiring from the position of Solicitor to the company, and the directors have appointed Mr. A. G. Hubbard to succeed him.

Mr. F. J. C. POLE.

Assistant General Manager, Great Western Railway.

MR. FELIX J. C. POLE, who has been appointed Assistant General Manager of the Great Western Railway, joined the railway service in the Telegraph Department at Swindon in October, 1891, and held posts for a short period at Port Talbot and Truro. In January, 1893, he was transferred to the office of the Electrical (now Signal) Department at Paddington, where he remained about three years. From 1896 to 1904 he was attached to the personal staff of the Chief Engineer and in the latter year was transferred to the General Manager's Office. Whilst in the Engineer's Office he became Editor of *The Great Western Railway Magazine*. At first this work was done at home in spare time, but this old-established publication was so improved and rejuvenated that shortly afterwards it was taken over by the company and issued as an official staff publication. Mr. Pole continued to be responsible for the Magazine until early in the present year, in addition to his numerous other duties which increased year by year in variety and responsibility. A hard worker with a broad outlook and rarely ruffled, his appointment in 1913 as Chief Clerk to the General Manager was no great surprise to those who knew him. On Mr. Glover's retirement in March last, he became Assistant to the General Manager. For several years past he has been Secretary of the company's side of the Great Western Railway's Conciliation Boards and also of the recently formed

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Supervisory Staff Conferences. Few railway officers have such a close knowledge of railway staff and labour matters. He took an active part in the formation of the Great Western Railway Lecture and Debating Society.

* * *

MR. F. W. SHOWERS, F.S.I., who has been appointed to succeed Mr. Pole as Assistant to the General Manager, Great Western Railway, was born at Taunton in January, 1872. At the age of 16 he entered the service of the Great Northern Railway Company, and was employed in the Traffic Department for four years, two of which were spent in the office of the Manager of the Midland and Great Northern Joint Railway. In 1892 he was transferred to the Surveyor's Office, and after four years at King's Cross went to Manchester to represent the Surveyor in connection with the purchase of property for the Great Northern Deansgate goods depôt. In 1899 he returned to London and the rating work was added to his other duties. In 1903 Mr. Showers became Chief Assistant to the Surveyor, and a year later was the recipient of the "Rosebery" gold medal for an essay on "The Rating of Railways." Mr. Showers joined the Great Western Railway in August, 1907, as Assistant Rating Agent, and was appointed Rating Agent in March, 1913. Mr. Showers is a Vice-President of the Great Western Railway Lecture and Debating Society and of the Great Western Railway Athletic Association.

* * *

OWING to the appointment of Mr. C. Aldington, C.B.E., as Assistant General Manager, and now as General Manager, Great Western Railway, Mr. Edwin C. Cox, C.B.E., Superintendent of the Line, South Eastern and Chatham Railway, has been elected chairman of the Superintendents' Conference of the Railway Clearing House for the remainder of the year, and to continue until the end of 1920.

* * *

MR. C. H. DENT, General Manager, Great Northern Railway, has been unanimously elected Chairman of the General Managers' Conference of the Railway Clearing House for the year 1920.

* * *

FOR some years the Goods Department of the London and South Western Railway, under the direction of Mr. J. Smeal, Indoor Goods Manager, and Mr. G. T. Hedge, Outdoor Goods Manager, has had six districts—London, Southampton, Salisbury, Reading, Exeter, and Plymouth—whereas both the traffic and engineers have but three—London, Central, and Western. With the retirements of Mr. F. J. Woodbridge, Devonport, at the end of 1918, and of Mr. H. Venton, Exeter, on June 30 last, arrangements have been made for the goods districts to be reduced to four, as follows:—

(1) *London*, embracing all territory from London to Windsor, Reading, Whitchurch, Shawford, Wickham, Rowlands Castle and branches. *Superintendent:* Mr. F. S. Bridge, Waterloo; *Assistant Superintendent:* Mr. H. Spurgeon, Reading.

(2) *Southampton*, embracing the seaboard between Havant, Portsmouth, Southampton, Lymington, Bournemouth, Swanage, Weymouth, the Isle of Wight, and Eastleigh, Romsey, Ringwood, and Wimborne. *Superintendent:* Mr. C. Giles, Southampton.

(3) *Salisbury*, which includes the territory from Hurstbourne to Chard, and the Fullerton, Fordingbridge, Blandford and Bulford branches. *Superintendent:* Mr. J. P. Milton, Salisbury.

(4) *Western.*—Axminster and all territory west thereof. *Superintendent:* Mr. W. T. Venton, Exeter; *Assistant Superintendent:* Mr. J. J. A. Canter, Devonport.

* * *

MR. E. C. GILL, the head of the Canadian Pacific Railway Publicity Department in Europe, left Liverpool on 1st August by the C.P.O.S. line "Minnedosa" for a tour through Canada, in order to obtain the latest information with regard to the prospects for British settlers and manufacturers in the Dominion of Canada.

Mr. E. C. GILL,
Chief of the Publicity Department in Europe,
Canadian Pacific Railway.

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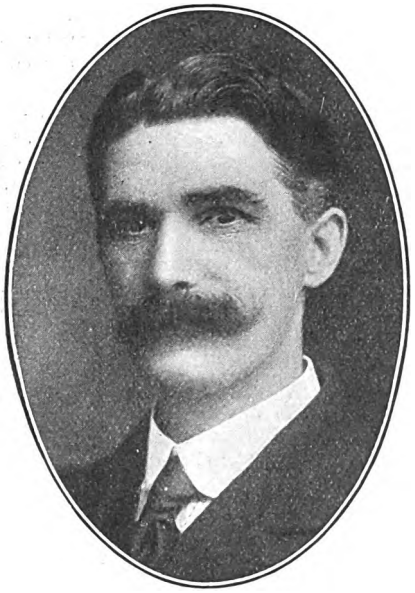

Elliott] [*& Fry.*

Mr. R. H. TODD,

London Cartage Manager,
G.N., G.C. and G.E. Railways.

MR. R. H. TODD, who has been appointed London Cartage Manager for the Great Northern, Great Central, and Great Eastern Railways, in succession to Mr. A. Saward, entered the service of the Great Northern Railway at Spalding in April, 1885. After a few years' training there and experience at other stations, he was transferred to the District Superintendent's Office at Boston. After occupying various positions in that office, including that of Relief Stationmaster for a short time, he was appointed, in June, 1896, to the position of Chief Clerk to Mr. G. Shaw, then District Superintendent at Boston, but now Chief Goods Manager at King's Cross. On Mr. Shaw leaving Boston for London in 1902, Mr. Todd was appointed Chief Clerk to the District Goods Manager, and, in October, 1903, was appointed Goods Agent at Boston and Boston Dock. In September, 1910, Mr. Todd was transferred to Nottingham as Goods Agent, and, in October, 1916, was promoted to the charge of King's Cross Goods Station.

* * *

MAJOR GILBERT S. SZLUMPER, Deputy Docks and Marine Manager, London and South Western Railway, has been appointed by the King of the Belgians "Officier de l'Ordre de la Couronne," in recognition of services rendered in connection with the Belgian refugees.

MR. GUY, J.P., Senhouse, Netherhall, Maryport, has been appointed a director of the Maryport and Carlisle Railway Company, to fill the vacancy caused by the retirement of Mr. E. T. Tyson, Wood Hall.

* * *

MR. AUSTIN G. HUBBARD, who has been appointed by the directors to succeed Mr. L. B. Page, M.A., who has retired from the position of Solicitor to the Great Western Railway, was educated at Tonbridge, and served his articles with Mr. G. R. Hubbard, of Chancery Lane. He passed his Law Final Examination in 1895, and in the following January commenced a six-months' pupilage at Paddington under Mr. R. R. Nelson, the company's Solicitor at that time. At the expiration of that period he was appointed an Assistant in the Prosecution and County Court section of the solicitor's department. Later he was engaged in the more general work of the solicitor's office, and became thoroughly familiar with its various branches. During recent years he has given special attention to Chancery and Common Law business, and since the outbreak of war dealt largely with matters arising out of the emergency legislation of these unprecedented years. In February last, on the retirement of Mr. J. E. Bowen, Mr. Hubbard was appointed Principal Assistant to the Solicitor. During the war he was a keen member of the Berkshire Volunteer Regiment, and has acted as Assistant Adjutant since July, 1917.

Mr. A. G. HUBBARD,

Solicitor, Great Western Railway.

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As from July 1, five outdoor general assistants have been appointed to alternate in the general working of the Passenger and Goods Departments of the London and South Western Railway, under the personal direction of the Outdoor Goods Manager and the Assistant Superintendent of the Line, respectively :—

Mr. S. Barter, who entered the service in May, 1900, was stationed at Brockenhurst, Basingstoke and Plymouth Friary, being transferred to the Assistant Superintendent of the Line's Office in December, 1901. He became Chief Clerk of that department in 1912.

Mr. H. A. Short joined the service in March, 1913, under Mr. Marsh, at Nine Elms. He joined the Army as a gunner in the R.F.A., served in many engagements, and gained the Military Cross, ultimately attaining the rank of captain adjutant in the Suffolk Regiment.

Mr. J. E. Sharpe, who joined the service at Christchurch in February, 1900, was stationed at Kew Gardens, Kew Bridge, and Witley, being transferred to the District Superintendent's Office at Clapham Junction in 1909, and to the Assistant Superintendent of the Line's Office in February, 1917. He is a keen scholar, and gained three first-class certificates at the School of Economics, the subjects being "Law of Carriage," "Operating" and "Commercial," receiving also the Brunel Silver Medal.

Mr. W. A. Steel entered the service in 1906 at Nine Elms. He was transferred to the Outdoor Goods Manager's Office at Waterloo in 1913, and had the advantage of a good outdoor training for three or four years. At the School of Economics he successfully passed two examinations in Operating. An Army commission was conferred upon him in 1917, and in September of that year he was promoted to a first-class staff lieutenancy in the Royal Engineers. He passed through the Officers' Training School at Sandwich, served a period in the War Office, London, and was transferred to the war area in France where he became a R.T.O.

Mr. A. E. Hammett entered the service as a Junior Clerk in August, 1905, at the Borough Office. In 1913 he was transferred to the Claims Department at Nine Elms, and for some time past has been an outdoor representative on the staff of the London Goods Superintendent.

* * *

Mr. W. H. B. Jones, who has retired from the position of Running Superintendent, London and North Western Railway, joined the service in 1871 as a premium apprentice at Crewe works. There he served in various departments, and on the completion of his apprenticeship was, in 1876, appointed Junior Outdoor Assistant under Mr. T. W. Worsdell, then Works Manager. Later, Mr. Jones was appointed Assistant to Mr. A. L. Mumford, Southern Division Running Superintendent, and for several years had charge of various districts and locomotive sheds in the Southern Division. In 1890 he returned to Crewe to take charge of the engine sheds, and as assistant to Mr. G. Whale, Northern Division Running Superintendent. He was later relieved of the shed oversight in order that he might devote himself entirely to the work of assistant to Mr. Whale. In 1903 Mr. Jones was appointed Chief Assistant to Mr. C. J. Bowen Cooke, on his taking control of the Southern Division Running Department, Mr. Whale becoming Chief Mechanical Engineer ; and in 1909, when Mr. Cooke succeeded Mr. Whale, Mr. Jones became Running Superintendent in charge of the Southern Division. In 1916, on the retirement of Mr. Beaumont, Mr. Jones was promoted to be Running Superintendent for the whole system.

* * *

In consequence of the retirement of Mr. W. H. B. Jones, the directors of the London and North Western Railway Company have made the following appointments, as from July 1 :—

Mr. J. A. Bowes, Crewe, Running Superintendent, Southern Division, comprising all locomotive stations south of and including Crewe.

Mr. W. F. Black, Crewe, Running Superintendent, Northern Division, comprising all locomotive stations north of Crewe.

Mr. F. W. Dingley, Outdoor Mechanical Superintendent of Motive Power (Locomotive and Road Motors), with supervision of all mechanical staff and repair work at Steam sheds and motor depôts. No. 2 Euston Square, Euston, N.W. 1.

Mr. J. Shearman, to deal with running matters connected with the Road Motor Department ; attached to the staff of the General Manager. No. 2, Euston Square, Euston, N.W. 1.

* * *

Mr. W. F. Black, who has been appointed Running Superintendent of the Northern Division (comprising all locomotive stations north of Crewe), London and North Western Railway, commenced as a premium apprentice at Crewe Works in October, 1894, and in March, 1897, became a private pupil under the late Mr. F. W. Webb. In March, 1899, he was transferred to the Drawing Office Staff, and in September of the same year became an Outdoor Assistant to the Works Manager. At the end of March, 1901, Mr. Black was appointed Assistant Foreman at the Long-

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Mr. W. F. BLACK,
Locomotive Running Superintendent, Northern Division, L. & N.W.R.

sight Running Shed, and in February, 1902, Foreman at the Birkenhead Running Shed. In July, 1903, he was appointed Junior Assistant in the Northern Division Running Department, and in March, 1909, became Senior Assistant in the same department.

Mr. J. A. BOWES,
Locomotive Running Superintendent, Southern Division, L. & N.W.R.

MR. J. A. BOWES, who has been appointed Running Superintendent, Southern Division, London and North Western Railway, covering all locomotive stations south of and including Crewe, is a son of the late Mr. John Bowes, M.R.C.S., L.R.C.P., of Herne Bay. He was educated at Epsom College, and entered Crewe Works as a premium apprentice in September, 1892. Having served his apprenticeship, Mr. Bowes became a pupil of the late Mr. F. W. Webb in February, 1896, and on completion of his term of pupilage entered the Drawing Office in March, 1897. In May, 1898, he was appointed Assistant at the locomotive shops and sheds at Longsight, Manchester, and in August, 1899, was placed in charge of the engine sheds at Shrewsbury. In November,

Mr. F. W. DINGLEY,
Outdoor Mechanical Superintendent of Motive Power (Locomotive and Road Motors), L. & N.W.R.

1902, he returned to Longsight to take charge. In July, 1903, Mr. Bowes was appointed Assistant Running Superintendent at Crewe.

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MR. F. W. DINGLEY, who has been appointed Outdoor Mechanical Superintendent of the London and North Western Railway, has held the position of Road Motor Superintendent, having charge of both the mechanical and commercial sides, since 1914. Mr. Dingley comes of a railway stock, his great grandfather having been a storeman for the firm of Boulton & Watt; his grandfather was in the Locomotive Department of the Grand

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Junction Railway, and was subsequently transferred to Crewe as foreman of the erecting shops; whilst his father was shed foreman at Springs Branch engine shed. Mr. Dingley himself was assistant locomotive foreman at Willesden Shed, foreman at Rushbury, and foreman at Willesden. In 1909 he was made Assistant to the Chief Mechanical Engineer for the London Division, whence he was removed to Crewe to take the position of Motor Road Superintendent mentioned above.

* * *

Mr. ALFRED OLDHAM, hitherto an assistant to the General Manager, Great Central Railway, has been appointed Assistant Superintendent of the Line. Mr. Oldham has spent nearly the whole of his railway career in the Traffic Department of the Great Central Railway, rising to the position of Chief Clerk to the Superintendent of the Line. In 1914, he was transferred to Sir Sam Fay's personal staff, becoming Chief Clerk in the General Manager's department. Subsequently he was made an assistant to the General Manager.

* * *

MR. HUGH CARR, J.P., Chairman of the Maryport Magistrates, formerly Secretary and General Manager, and later a Director of the Maryport and Carlisle Railway, died on July 27, aged 81. Mr. Carr was for 56 years in the service of the railway company, having been General Manager and Secretary for 24 years. He retired from those positions in March, 1908, and was forthwith elected a Director, but retired from the board in 1916.

* * *

MR. DOUGLAS EVE, London and South Western Railway Running Superintendent at Eastleigh, for several years Chairman of the Board of Management of the London and South Western Railway Orphanage at Woking, was taken seriously ill while attending a board meeting recently, and died shortly after being conveyed to his home at Eastleigh.

* * *

CAPTAIN W. A. WARNEFORD, commander of the airship (NS 11) which was lost in the North Sea, was the only child of Mr. W. H. Warneford, Wagon Superintendent, London and North Western Railway, Earlstown. He was a cousin of Lieutenant Warneford, V.C., who brought down the first Zeppelin at Cuffley.

* * *

AN interesting function took place recently at London Bridge Station, London, Brighton and South Coast Railway, the occasion being a presentation to Mr. William Little, on his retirement after 45 years' service. Mr. Little was for many years attached to the Special Traffic Section of the Department of the Superintendent of the Line, of which he has had charge for the last 12 years. The gifts were handed by Mr. Finlay Scott, Superintendent of the Line, who made a few felicitous remarks appropriate to the occasion, and to which the recipient fittingly replied.

* * *

To "wind up" the Wirral Railway Comforts Fund a pleasant dinner was recently held at New Brighton by the subscribers and about thirty returned soldiers and sailors who in civil life are employed on the railway. The chair was taken by Mr. J. H. Burns (General Manager), and he was supported by Messrs. G. Harris (assistant manager), and T. D. Jones (out-door assistant manager), and Capt. E. J. Blayney (formerly a fitter in the employ of the Company), who had risen from the ranks during the war. In the course of an excellent and appropriate speech Mr. Burns said that the fund was started at the beginning of the war to provide comforts for their men who became soldiers and had gone forth to distant lands. The money was subscribed by the staff and employees and the total disbursed reached £236. This was a practical way of showing the brotherhood that was so marked a feature in railway life, They were fortunate in having so indefatigable a secretary as Mr. Geo. Harris, and the assistance of a representative committee of all branches of the service. Their activities were not confined to the forwarding of parcels, as donations were given to various organisations in the district, and the families of the men were not forgotten. They had met for the purpose of according to the men of the Wirral Railway who did their duty by entering the ranks of the fighting forces the great appreciation of their compatriots who remained at home to carry on the work of the transport of this country. The enthusiasm of the men at the outbreak of the war and their detestation of the horrors perpetrated by the enemy made it almost impossible to restrain the rush to the colours and the railways of the country encountered serious difficulty in coping with the sudden traffic thrown upon their attenuated staff at the time. The call of skilled railway workers was nobly responded to by the men in all departments. The Wirral men did their share as 53 joined the ranks. But there was, as they knew, a sad side to the trouble, and in every mind in the room there was a memory which time could not efface, for they mourned the loss of 9 of those fine fellows whose blood was shed in defence of their homes.

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MR. ARTHUR T. COTTON has been appointed Irish Traffic Manager for the London and North Western Railway Company, in succession to Mr. H. G. Burgess, who is to be Director of Irish Transport of the Ministry of Ways and Communications. Mr. Cotton has been District Traffic Superintendent at Abergavenny (Mon.) for the South Wales Division of the London and North Western Railway for over three years, and prior to that for a considerable number of years he represented the Lancashire and Yorkshire and London and North Western companies in Belfast and the North of Ireland in connection with the Belfast and Fleetwood steamers. Mr. Cotton is a son of the late Mr. E. J. Cotton, for many years General Manager of the Belfast and Northern Counties Railway.

* * *

An appreciative letter of thanks for services rendered has been received by the Glasgow and South Western Railway from Mr. R. Stuart Smith, Commissioner to the American Red Cross for Great Britain. Mr. Smith remarks :—

"The American Red Cross is about finishing its work in Great Britain, and I take this opportunity of expressing to the officers and directors of your Company our sincere thanks for the most valuable assistance rendered us by the Glasgow and South Western Railway in connection with our numerous shipments over your lines, and for the constant consideration and courtesy shown our people by your various staffs. Notwithstanding the tremendous strain upon your organisation after several years of war and the necessary reduction in your force, we have never suffered from any lack of service on your part. Our shipments have never been refused notwithstanding congested conditions and embargoes. Although service of this sort would have warranted the maximum charges, you have generously granted us special rates, which resulted in a very large pecuniary saving to our Society. It is difficult for me to tell you what this help and encouragement meant to us in our work in England, and I trust you will lay this letter before the officers and directors of your Company as an inadequate expression of the gratitude of the American Red Cross."

* * *

IN addition to assuring the prosperity of the railway under his control a capable general manager is a valuable asset to the district served by his line, and a distinct boon to the business community within his sphere of influence. This is not always recognised, outside railway circles, but it is pleasing to record that in the case of Mr. Alfred Aslett, J.P., who recently retired from the positions of secretary and general manager of the Furness Railway, public appreciation of his past work has found free expression, and, as already recorded in the RAILWAY MAGAZINE, various valuable presentations have been made to him as tokens of the high estimation held for his skill and capacity in using his powers as a railway manager for the development of British industry and the fostering of our national trade. Recently at the Savoy Hotel, London, a further testimonial of this character was made, when Mr. Aslett was presented with a beautifully engraved silver tray and a handome silver rose bowl, by the Asiatic Petroleum Company as evidence of their appreciation of his services to the motor spirit trade of the United Kingdom.

Mr. Samuel Samuel, M.P., in proposing the health of the guest on the occasion of the presentation, after paying tribute to Mr. Aslett's association in the development of the British railways, referred particularly to his intimate association with the development of the motor industry by reason of his foresight and sagacity in offering storage facilities to the leading Oil Companies, such as represented by the "Shell" interest, with which the Asiatic Petroleum Company is so intimately associated at Barrow-in-Furness, and in the progress made of the motor industry under such circumstances, much was due to the foresight of Mr. Aslett. In connection with petroleum products, many obstacles have been placed in the way of storage facilities, and it is a well acknowledged fact that the all-important item of motor fuel, in the advance of motor transport, which has played such an important part of the war which has just come to an end, is its use on the meanest possible car to the highest speed engine or aeroplane and airship. Mr. Samuel had no hesitation in repeating that, but for the foresight of such a man as Mr. Aslett, with an industry such as that with which his own companies were connected, and with the fortune of the railway companies being so much associated, the matter of motor transport would possibly have been at a standstill, had not such facilities been offered through the instrumentality of the Furness Railway, with Mr. Aslett as its general manager, which enabled them to store and distribute petroleum produce from this very important centre. In wishing Mr. Aslett, upon his retirement, long life and happiness, and asking him to accept the presentation from the Asiatic Petroleum Company, Mr. Samuel expressed the hope that Mr. Aslett would continue to use his indefatigable energy, his efforts to further develop that section of the rail-

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way community and public bodies, which still lack enterprise in offering facilities for the storage of petroleum products.

* * *

ORIGINALLY designed to develop the large iron ore traffic and furnish a shorter route for it from Northamptonshire into South Wales, the Stratford-upon-Avon and Midland Junction Railway of to-day serves many other useful purposes. It forms a connecting link for goods traffic between the main lines of the Midland, Great Central, London and North Western Railways, and is within easy reach of the Warwickshire and Midland coalfields. There are immense quantities of ironstone in the district in addition to large quantities of limestone. These facts, coupled with the circumstance that there is much cheap land adjacent to the railway suitable for blast furnaces, factories and works, indicate that in the near future there is likely to be considerable industrial development in the districts served by the Stratford-upon-Avon and Midland Junction line, particularly in Northamptonshire, and in that part of Warwickshire adjoining the former county. Under the capable management that controls the Stratford-upon-Avon and Midland Junction the railway ought to secure a considerable share of the advantages that should accrue from the promotion of the various schemes for the reconstruction of industry that are now occupying the minds of business men.

* * *

NOWADAYS anything which will effect economy, and make a ton of coal go further than before, is of vital importance to British industry. Notwithstanding all the improvements of recent years, it is a fact that a vast amount of coal is wasted annually through the loss of steam by condensation in steam boilers and pipes. Tests made by the Whitworth Engineering Laboratory, of the University of Manchester, show that in an ordinary steam pipe, unprotected by non-conducting covering, the amount of water condensed was no less than ·845 lb. per square foot of external surface per hour, while in a corresponding pipe covered to a thickness of 2·11 in. with Bell's United Asbestos Non-conducting Composition, the condensation was reduced to ·162 lb., showing a saving of 81 per cent. This was confirmed by further tests carried out by Messrs. Lake & Currie, the well-known consulting engineers, of London, and the following details tell their own story :—

Mean steam pressures absolute ...	154
Mean steam temperature Fah. ...	X 371°
Mean lbs. condensed by the bare pipe per square foot per hour ...	0·9898
Mean lbs. condensed by the covered pipe per square foot per hour	0·152
Mean difference of temperature Fah. of external air and steam supplied	X 284°
Mean lbs. condensed by the bare pipe per square foot per hour per degree Fah., difference of temperature	0·00327
Mean lbs. condensed by the covered pipes per square foot per hour per degree Fah., difference of temperature	0·000541
Approximate relative per centage of condensation in bare pipe ...	100 per cent.
Approximate relative per centage of condensation in covered pipe	16·9 per cent.

This equals a saving in condensation of 83·1 per cent.

The immense economy in coal effected by a saving of 83·1 per cent. in condensation should be realised by every steam user. It is stated that in a boiler and range of piping having a total surface of 1,000 square feet, working 50 weeks at 96 hours per week, the saving effected by an 83·1 per cent. reduction of condensation is equivalent of 220 tons of coal per annum. A great number of steam plants are to-day covered with effective non-conducting composition, but there is still a considerable amount of leeway to make up, and it behoves every engineer to see that all steam piping, as well as the boilers, are efficiently covered. Nor should the flanges, bends, and tee-pieces be overlooked, as is too often the case. These form a considerable percentage of the total surface, and the maximum economy can only be effected if every square foot is covered. Objection is sometimes taken to covering the flanges with composition, but many forms of removable coverings with well-designed flange boxes are in the market which overcome the difficulty raised. The day when "anything would do" has gone for ever, and it is only by giving attention to points like these—thus effecting scientific economy—that British manufacturers will be able to hold their own in the struggle for world trade.

* * *

THE second horticultural show organised by the London and North Western Railway Horticultural Society (London and Southern Division) was held at Euston Square Gardens. There was a large attendance of members, friends and visitors, and the function was most successful in every way. Mr. W. E. Dorrington, a director of the company, opened the proceedings, and reminded the large gathering of the success of the previous

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show, held last September, when over £50 was given to various war charities, while quantities of vegetables were sent to hospitals for wounded soldiers. The original Southern Division Horticultural Society, formed in 1910, had been merged into the larger one now concerned, the membership numbering about 1,500, covering all sections of the system south of Stafford. There was a very fine show of exhibits on view, and the series of valuable and useful prizes, many presented by firms concerned with horticulture, fully justified the keen competition which rendered the tasks of the judges no mean undertaking. The prizes were kindly presented by Mrs. W. E. Dorrington. During the afternoon the Watford Artisan Silver Prize Band rendered selections, while two concerts, arranged by Mr. A. C. Chapman, provided further interest on the musical side. It may be mentioned that the Society also includes members from the staff of McCorquodale & Co., Limited; and of the Railway Clearing House. Mr. C. F. Graseman is Chairman of the Committee, and Mr. G. N. Ford, O.B.E., London District Superintendent, Vice-Chairman. Mr. W. E. Bradbury, M.B.E., is Hon. Treasurer, and Mr. A. Lance and Mr. D. H. F. Meacock, Hon. Secretaries. Associated societies have been, or are being, formed at Birmingham, Coventry, Manchester, and other places.

* * *

ON and from Tuesday, August 5, and on Mondays, Tuesdays, Wednesdays and Thursdays thereafter during August, seat reservation has been instituted by the Great Eastern Railway in regard to trains from Liverpool Street Station serving east coast resorts. Application has to be made to the stationmaster at Liverpool Street not less than three days before travelling. Seats will not be reserved on Fridays, Saturdays, or Sundays.

* * *

FROM Crewe, Mr. C. Williams reports:—A new series of 4-6-0 passenger engines ("Prince of Wales" Class) will shortly be turned out, Nos. 444, 497, 501, 522, 601, 783, 924, 1125, 1290 and 1307. These engines replace 0-6-0 shunting tanks, which have been renumbered 3656—3665 respectively. Of the thirty 2-8-0 mineral engines which the London and North Western have acquired from the Government, and which are now in course of delivery from the makers, nine have been received and numbered in the stock, as follows:—Nos. 56, 67, 686, 812, 969, 1325, and 1341 (built by the North British Locomotive Co., Ltd.); and 635 and 1026 (built by R. Stephenson & Co.). The latest 4-cylinder compound passenger engine to be converted to "Renown" Class is No. 1939 "Temeraire." Thus, there are still 54 of these engines to be dealt with, of which 28 are "Alfred the Great" class and 26 "Jubilee" class. No. 1285 is the latest 4-cylinder compound mineral engine to be simplified and superheated.

* * *

THE Wirral Railway have recently acquired another of the London and North Western Railway's small 4 ft. 6 in. 2-4-2 passenger tanks—No. 969. This number is now taken by one of the new 2-8-0's. No. 3042, a 4 ft. 0-4-0 saddle-tank, built by Mr. Ramsbottom in 1865, was recently sold to Messrs. Kynoch's, of Birmingham.

* * *

MEMBERS of the Railway Club to the number of nearly thirty joined in a visit to the Old Oak Common locomotive sheds, Great Western Railway, on a recent Saturday afternoon. The party was met and conducted over the works by Mechanical Inspector Rogers, who proved an admirable cicerone. Several members availed themselves of the permission to use cameras. Among the notable engines in the shed was 4-6-2 No. 111, *The Great Bear*, while Great Western Railway locomotive history was worthily represented by 0-6-0 tank engine No. 1311, *Cheesewring*. A visit will be paid to Nine Elms Running Shed (London and South Western Railway) on Saturday, September 20. Meet at entrance in Brooklands Road (from Wandsworth Road) at 2.45 p.m. Cameras may be used.

* * *

THE Furness Railway have ordered from Messrs. Kitson & Co., five engines of the 4-6-4 tank type, for dealing with passenger, goods or mineral traffic. Cylinders will be 19½ in. diam. and 36 in. stroke; coupled wheels 5 ft. 8 in. diam.; boiler 5 ft. diam. and fitted with Belpaire firebox, total heating surface about 2,000 sq. ft. and grate area 26 sq. ft.; pressure, 170 lb. per sq. in.; tractive force at 85 per cent. of boiler pressure 21,000 lb.; estimated total weight in working order 95 tons; capacity of tanks, 2,200 gallons of water; bunker capacity 4 tons of coal. In course of construction at Barrow are some third-class bogie coaches with nine compartments. These have a length of 60 ft. 8 in. over buffers, and 57 ft. over the mouldings, with an extreme width of 9 ft. Height from rail to top of roof is 12 ft. 5 in. They are carried on two 9 ft. "Fox's" type bogies having their centres spaced 39 ft. apart.

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Frontispiece: Canadian Pacific Railway Royal Train Engine.
Review of Summer Services, 1919.
Stratford, G.E.R.—A Notable Junction.

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THE Railway Magazine

No. 268. OCTOBER, 1919. Vol. XLV.

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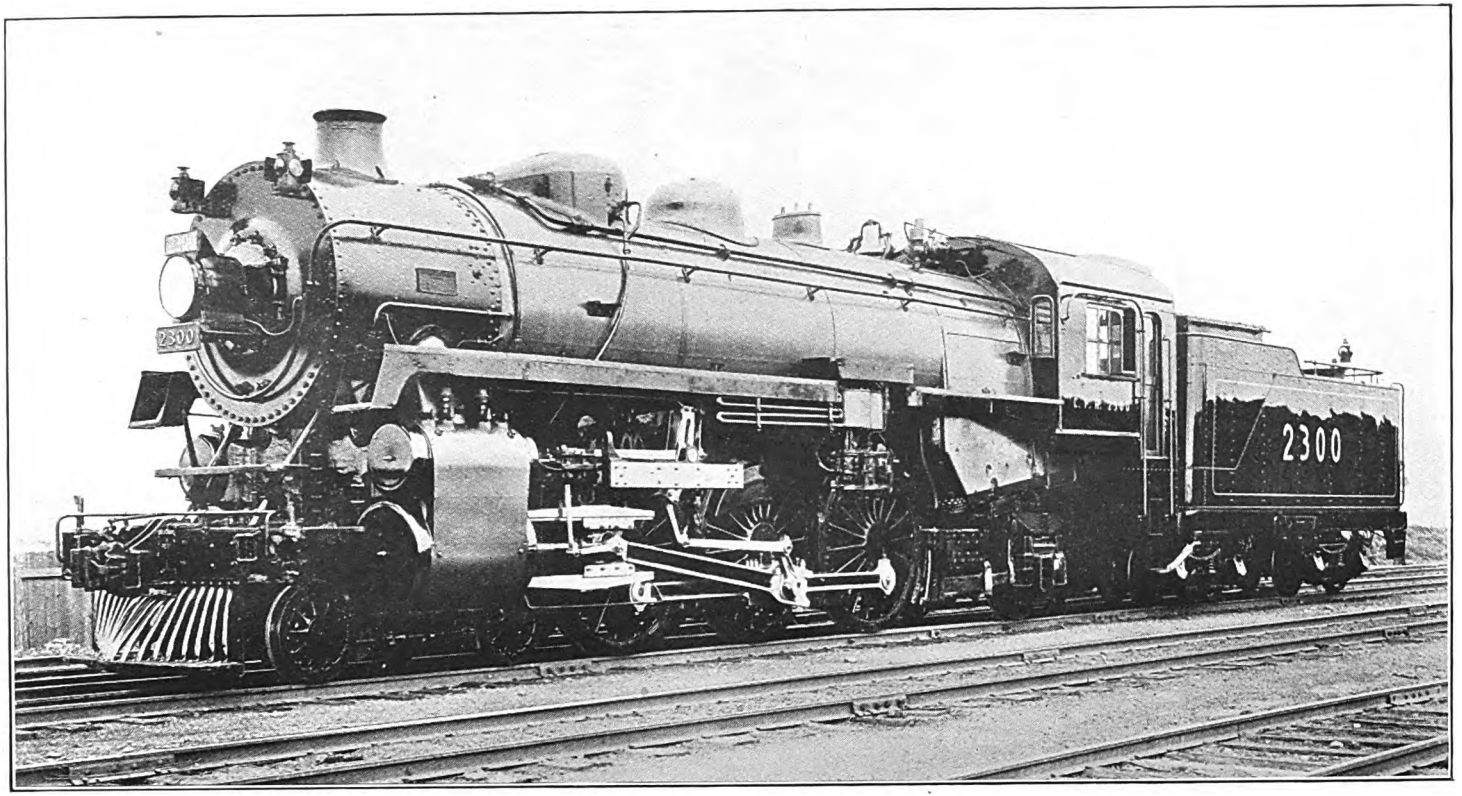

THE RAILWAY MAGAZINE.

CANADIAN PACIFIC RAILWAY: NEW 4-6-2 EXPRESS LOCOMOTIVE.

Built at Angus Workshops, Montreal. MR. W. H. WINTERROWD, Chief Mechanical Engineer.

Cylinders: 25 in. × 30 in. Coupled Wheels: 6 ft. 3 in. diameter. Heating Surface: 5,000 sq. ft.

Steam Pressure: 200 lbs. per sq. in. Tender Coal capacity: 12 tons. Tender Water capacity: 8,000 galls

Weight of Engine and Tender in working order, 214¼ tons

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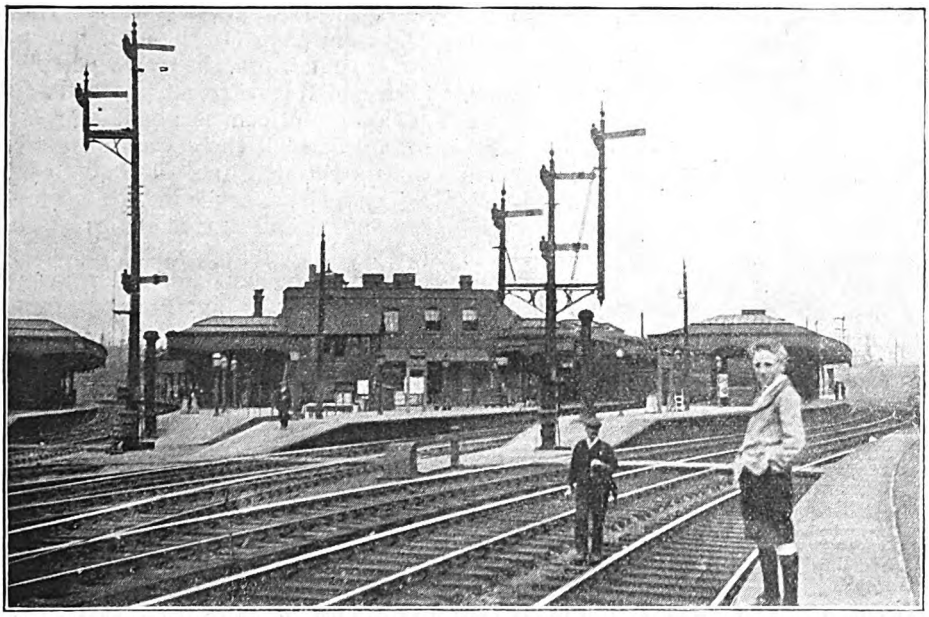

Photo.] [*J. F. Gairns.*

GENERAL VIEW OF THE STATION FROM No. 1 PLATFORM.

Left to right.—Platforms 7–6; Loughton and Cambridge lines; platforms 5–4, with carriage dock and timekeepers' office; Colchester route local lines; platforms 3–2; down "through," up "through," and up "through" loop lines; platform No. 1.

Famous Railway Junctions and Their Traffic.

STRATFORD: GREAT EASTERN RAILWAY.

By J. F. GAIRNS.

OPINIONS may differ as to whether Stratford is correctly described as a "famous" railway junction in the public sense. Its name is probably not quite so familiar to travellers as are those of Clapham and Willesden Junctions, or even to the same degree as Finsbury Park; but it is certainly famous for the volume and complexity of its traffic working. In regard to the Great Eastern Railway Stratford is the centre of a very wide variety of traffic, goods even more prominently than passenger, and in respect of traffic working there is probably no place where so great a volume of traffic is concentrated, involving, at the same time, variety of route and destination.

Although a junction including many route connections, the word "Junction" does not appear in the title of the station. As Stratford it is known—"Main" or "Low Level" in regard to the two sections of the principal station and to distinguish from the adjacent Woolwich line station at Stratford Market. Contiguous are the chief carriage sidings of the London district, the engine sheds and the locomotive and carriage works.

Two sketch plans are reproduced, each including, however, only the main features necessary for understanding references to follow, and therefore neither to scale nor including all or many of the track interconnections and the miles of sidings and auxiliary tracks. Dealing first with the station lay-out it will be seen that there are seven platforms in the main station and two in the low level. There are two public entrances. The more imposing is

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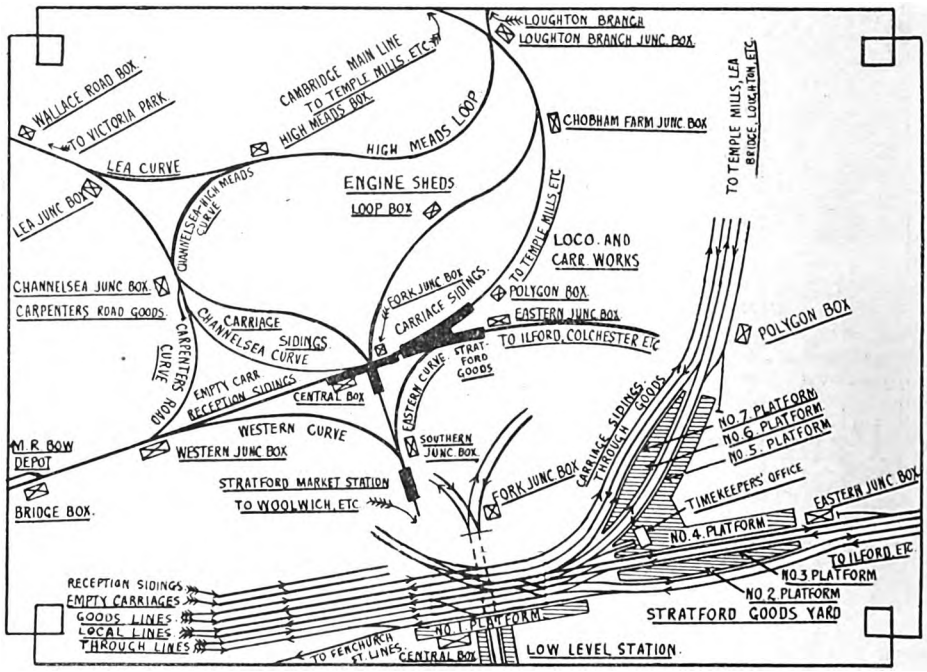
that known as Newtown, leading directly to the circulating area in the angle between Nos. 4 and 5. This entrance is not, however, very extensively used, though it is convenient for part of the district served and most of the milk traffic is also dealt with here as it gives direct access to the two platforms principally concerned. It is reached by a walled approach road directly alongside No. 4 platform, where an emergency exit is provided, while the other wall represents a boundary of the works area.

serve the Low Level station. The latter is at right angles to the main line, with no direct connection, the tracks passing under all the high level roads.

No. 1 platform is about 20 years old, prior to which there was no platform to the up through line. It had to be built as convenient, hence its present location; but it is useful in that it forms a loop to the up through line and is signalled so that a train in the loop can be sent away without again affecting the up through line unless that is necessary for its subsequent



SKETCH MAP SHOWING RAILWAYS IN THE STRATFORD AREA, AND PLAN OF THE STATION.

The busier entrance is that known as Subway or Martin Street. From outside this is relatively insignificant, but the heaviest pressure is dealt with here. Alongside is a subway leading to the works, where a majority of the men enter and leave. This subway is also connected with the lifts on platforms Nos. 2–3, 4–5 and 6–7, so that milk or other traffic can be transferred without interfering with public movements. From the booking office a system of passenger subways, with convenient staircases, leads to all platforms, that to No. 1 platform, which is not evel with the others, being extended to

procedure. Thus, an up train from Ilford to Fenchurch Street can be turned on to the up through line at Maryland Point, thence to No. 1 platform, and direct therefrom to the Woolwich lines from Stratford Market and so to the Fenchurch Street lines at Western Junction.

Nos. 2 and 3 are, respectively, the down through and up local platforms; No. 4 is the down local line for the Colchester route; and No. 5 is the up Loughton line. Correctly, Nos. 5 and 6 represent the Cambridge main line, which here leaves the Colchester main line to proceed past Temple Mills goods-marshalling yards to

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Tottenham; but as most of the Cambridge line passenger traffic is now sent *via* Hackney Downs, it follows that the Loughton line traffic is principally in evidence at Nos. 5 and 6, though there is plenty of Cambridge line goods traffic in the same direction. No. 6 is the down Cambridge or Loughton line platform, while No. 7 is a loop thereto, mainly used for local trains from Stratford to Waltham Cross, Hertford, &c. Beyond are up and down through goods lines, used also for empty carriage trains; and next are the main carriage sidings, where main line trains are broken up and assembled. There are also other carriage sidings on Channelsea used for Continental dairy produce. On the down side are the Stratford cattle pens and cattle-loading docks.

It is necessary now to consider the lines and connections of the Stratford area, apart from which traffic characteristics cannot be appreciated. The whole of the area concerned is, indeed, a veritable maze of loops and curves and sidings, with junctions and inter-connections almost innumerable. It is true that, as a whole, passenger traffic working is relatively simple; but there are certain complicating features even in regard to this, while the goods traffic is exceedingly complex and interesting.

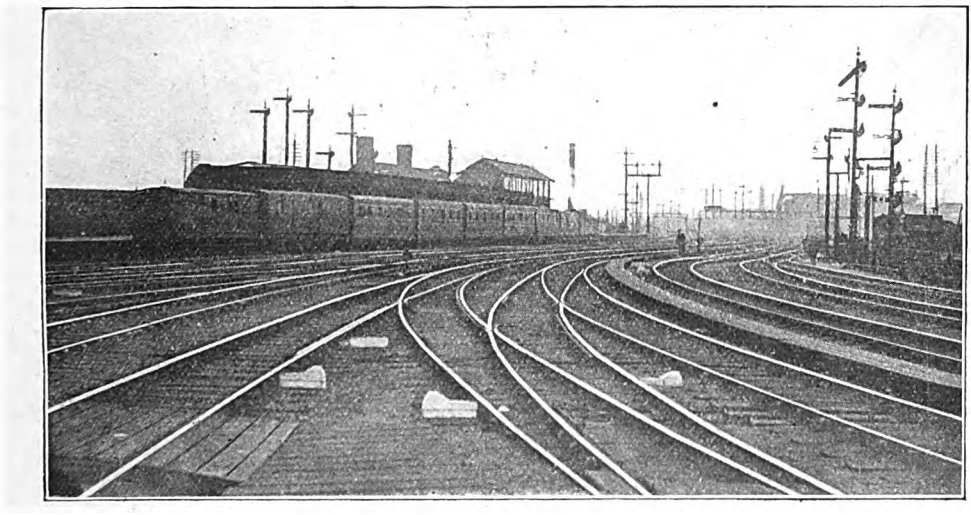

Photo.] [*J. F. Gairns.*

No. 1 PLATFORM, SHOWING CENTRAL JUNCTION SIGNAL CABIN.
The train is a Midland (L.T. & S. section) boat special from Tilbury Docks.

curve and opposite Loughton Branch Junction (to be referred to), the mileage for this purpose aggregating a large total, all classified generally as Stratford. North-east of the station, extending from the end of No. 5 platform, are the Locomotive and Carriage Works, which parallel the Cambridge line all the way to Loughton Branch Junction, though there are also other premises elsewhere in the district. Beyond the main carriage sidings are the big engine sheds of the London area. On the up side of the Colchester main line is the local goods and coal yard, extending nearly to Maryland Point Station. The lower yard was, before the war, largely

Referring to the sketch plan of the local lines and connections, the route from Liverpool Street is six-track—down and up local, down and up through and down and up Fenchurch Street—at Bridge Box the first of the 14 cabins under the control of the Stratford stationmaster. Here connection is made with the Midland Railway Bow depôt, a big and busy area reclaimed from the marshes, which the main line here crosses on a low embankment. At Western Junction the Fenchurch Street lines become the Western Curve leading to Stratford Market, with intercommunication between the three sets of tracks, while on the other side the local

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lines put off the through goods lines (which also serve several empty-train reception roads), and then lead to Carpenters Road curve. The first goods line connection is from the local lines only, so that a goods or empty carriage train can enter or leave the former free of the various inter-connections, but there are further cross-overs so that the goods lines can also be reached from the through and Fenchurch Street lines. The Carpenters Road curve is accessible from all lines and crosses the through goods lines. Opposite No. 1 platform Channelsea Curve comes through goods lines necessarily cross the Channelsea Curve tracks.

Proceeding down the Cambridge line past the works, the first junction is that known as Chobham Farm. Here a loop comes in from Fork Junction, where the Low Level lines divide after passing under all the main lines and sidings, and connection is also given to the Engine Shed lines. Exit from the main carriage sidings can also be had here in regard to non-terminal roads. A little further along is Loughton Branch Junction, where an outer loop (High Meads) comes in; while on the other

Photo.] [*J. F. Gairns.*

NEWTOWN ENTRANCE, BETWEEN Nos. 4 AND 5 PLATFORMS.
Showing collection of empty milk churns for afternoon return specials.

in from its connection with Carpenters Road Curve at Channelsea Junction, there being just sufficient distance along the base of the triangle for empty carriage trains on the reception roads clear of the junctions. From Channelsea connections are given across to the through lines, including the up through loop at No. 1, or to Nos. 5, 6 and 7. Round Channelsea Curve is an extensive system of empty-carriage sidings, and shunting frequently extends from the main carriage sidings round the curve. Trains entering or leaving the main carriage sidings and side the Loughton Branch diverges. Beyond, the main line continues to Temple Mills marshalling yard and onwards *via* Lea Bridge to Tottenham, &c. In the angle between the main lines and the Loughton Branch are the Leyton permanent way stores.

Returning to Stratford Station, to the south the Low Level lines lead to Stratford Market Station, joining first the Eastern Curve (near Brown's siding) from the main through lines opposite No. 2 platform, and then the Western Curve from Western Junction. Proceeding northwards the Low

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Level lines divide at Fork Junction, the loop leading to Chobham Farm Junction as already mentioned and giving connections with the engine shed lines, while the other route leads across to Channelsea Junction, joining Channelsea and Carpenters Road Curves. Immediately beyond it bifurcates again, forming two sides of a triangle. The direct route leads to Lea Junction and proceeds onwards to Victoria Park, joining the North London Railway. At Channelsea Junction there is also connection to Carpenters Road goods sidings. The other route, the Channelsea—High Meads Curve, joins the Lea Curve from Lea Junction and then continues as the High Meads loop to join the Cambridge main line at Loughton Branch Junction. This route also gives connection with the engine sheds.

These are the through routes, but it will be understood that in all directions there are sidings and connections, the whole area being a maze of tracks of one kind or another. To control traffic 14 signal cabins are under the control of the Stratford stationmaster, the list with number of levers in each being as follows :—

Bridge Box	40
Western Junction	140
Central (No. 1 platform)	165
Eastern Junction (No. 4 platform)	95
Polygon (No. 5 platform)	24
Chobham Farm Junction	62
Loughton Branch Junction	90
Southern Junction	45
Fork Junction	32
Channelsea Junction	76
Lea Junction	20
High Meads	32
Loop Junction	50
Wallace Road	20

The last mentioned, beyond Lea Junction towards Victoria Park, is manned only when required, serving the sidings of Messrs. Clarke, Nicholls and Coombs, of "Clarnico" fame, and for a war factory. All the others, except Lea Junction, are 24-hour boxes, open all the year round.

In regard to passenger traffic the following are the principal services concerned :—

(*a*) Colchester main line, including Southend, Clacton-on-Sea, &c., from Liverpool Street, *via* the up and down through lines, usually No. 2 down and up through line if not calling at Stratford, but using No. 1 when required. Occasionally such trains use Nos. 3 or 4.

(*b*) Cambridge line trains. These are few in number, the principal being the up night mail from Norwich, &c., which comes this way *via* No. 5, and the up and down night parcels mail trains. A few Liverpool Street—Hertford trains travel this way, but by far the greater part of the Cambridge line passenger traffic is dealt with *via* Hackney Downs.

(*c*) Stratford—Cambridge line locals. These are not numerous, and to avoid reversing at Stratford arrive *via* Loughton Branch Junction, High Meads loop and Junction, Channelsea Junction and Channelsea Curve into No. 7, waiting there ready for another departure.

(*d*) Liverpool Street—Ilford route and main line stopping trains (including Fairlop *via* Ilford and Barking trains). These can reach No. 4 from the local lines, but usually do so *via* the through lines. Many are fast from Liverpool Street and use the through lines to Stratford, while in numerous instances, especially if not calling, they traverse No. 2 and turn on to the local lines at Maryland Point unless they are fast to Ilford or beyond. Up trains may therefore travel on No. 1 or No. 3 or may pass on the up through line.

(*e*) Fenchurch Street — Ilford trains transfer at Western Junction to the through lines, and so to No. 4, or *via* No. 2 to Maryland Point. Up trains at No. 3, thence to up through, or at No. 1, whence they can run direct to the Fenchurch Street lines as already mentioned.

(*f*) Liverpool Street—Loughton trains usually run local lines throughout, whether fast or slow, and use Nos. 5 and 6.

(*g*) Fenchurch Street—Loughton line trains transfer from Fenchurch Street lines to local at Western Junction.

(*h*) Canning Town—Victoria Park locals from Low Level *via* Fork, Channelsea and Lea Junctions.

(*i*) Woolwich—Palace Gates trains travel from Low Level *via* Fork, Channelsea, High Meads and Loughton Branch Junctions and so to Lea Bridge. In addition there used to be a service of Stratford—Chingford locals adopting the route set out in (*c*) ; on Bank Holidays through Woolwich-Chingford trains are run *via* Low Level, following the route set out in (*i*) ; and during the war period (one or two still remain) there were Ilford—Woolwich workmen's trains *via* the through lines, Eastern Junction and Southern

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Junction. There were also munition workers' trains between Cheshunt and Woolwich, and one or two of these are still operated. In the past there have also been St. Pancras, Gospel Oak or Chingford —Clacton-on-Sea specials *via* Loughton Branch Junction, High Meads, Channelsea Curve and across to the main through lines; while war specials, ambulance trains, &c., have utilised all the possibilities available.

In regard to goods traffic all the various routes and junctions are made use of, and in addition to trains of the Great Eastern Railway the following foreign working is regular: (1) *Midland*: (*a*) from Loughton Branch Junction *via* 5 and 6 or the goods lines to Bridge Box for Bow Depôt, or to the Fenchurch Street lines to reach Royal Mint Street Depôt, or *via* Limehouse Curve to Millwall and West India Docks; (*b*) from Chobham Farm Junction *via* Loop and Fork Junction through the Low Level station to the Woolwich line. (2) *Great Northern*: from Victoria Park *via* Lea, Channelsea and Fork Junctions through the Low Level station to Woolwich line. (3) *London and North Western*: the same route to reach Canning Town depôt and the Woolwich line. (4) *North London* (London and North Western and Great Western traffic): from Victoria Park *via* Lea, High Meads and Loughton Branch Junctions to Temple Mills.

There is also heavy empty carriage train traffic, and this includes not only that directly produced by the main carriage sidings and that associated with it from Channelsea sidings, but also that from the new sidings opposite Loughton Branch Junction, as well as some passing to and from Ilford, Tottenham, and other carriage sidings with which Stratford is only concerned as passing train movements. As a rule engines from and to the engine sheds use the various loops so as to avoid affecting the main routes as much as possible. Frequently they leave the sheds *via* the High Meads loop and work round the various curves to reach the desired sets of empty coaches, and most of them work back from Liverpool Street to Stratford with empties. Such movements add very much to the traffic working at Stratford, though they affect mainly the various loop signal cabins.

But even although the main routes are

Photo.] THE SUBWAY (MARTIN STREET) BOOKING OFFICE. [*J. F. Gairns.*

A portion of the Workmen's Subway, giving access to the Locomotive and Carriage Works, is seen on the extreme right.

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relieved of a large portion of the incidental traffic movements they are all very busy. Probably more suburban trains use the through lines than there are main line trains, and at busy periods there is a constant succession of trains on every road, while at other times goods and like train movements are numerous, some of them necessitating inter-running with the passenger trains during rush hours. In the aggregate considerably over 1,000 train movements are dealt with at Stratford daily.

Although, however, Stratford deals with so many train movements it is not itself an exceptionally busy station on the passenger side, though changing traffic is a heavy item. During last July about 87,000 passenger tickets were issued at the station. About 800-900 workmen's tickets are issued daily and some 300 season tickets are usually current. A large proportion of the passenger traffic passes through, or changes, Stratford itself being a busy industrial area from which better class residential traffic has long since migrated further out. The numerous works and factories and large business houses in the district produce, however, a considerable passenger traffic and a large volume of parcels and like traffic. An average for the latter is about 23,000 parcels per month. This includes tomato, cucumber and special vegetable traffic received on behalf of firms doing business with Stratford Market but not having premises therein or supplied in complete wagon loads. This traffic is received at the main passenger stations and carted to the Market.

Beyond the Eastern Junction signal cabin is a horse-loading dock, and here a fair amount of horse and special cattle traffic is dealt with. The bulk of the cattle traffic is, however, received at the pens a little further along the line. This work is included with that of the Stratford goods yard on the up side of the Colchester main line extending from Eastern Junction to Maryland Point Station.

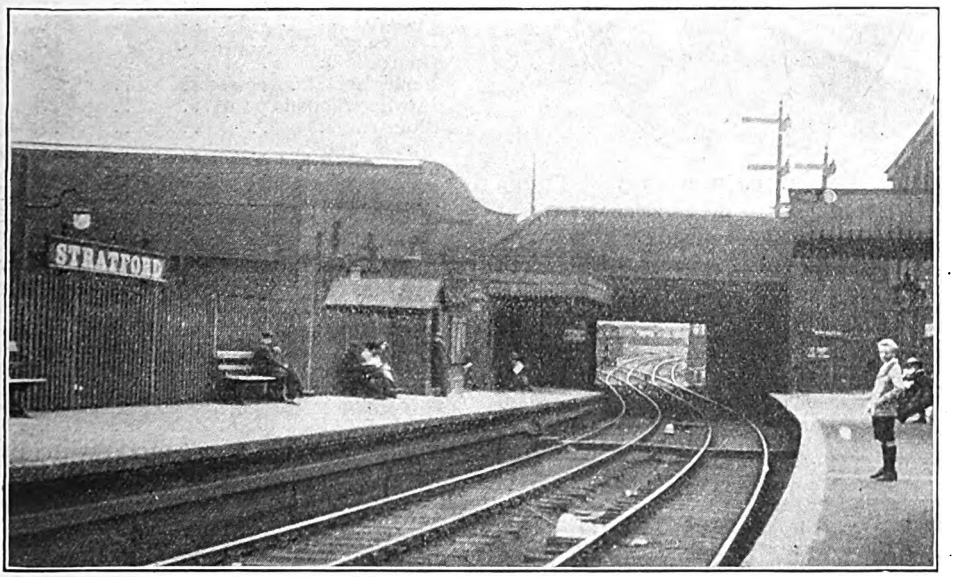

Photo.] THE LOW-LEVEL STATION. [*J. F. Gairns.*

Showing Fork Junction just beyond tunnel under main lines and sidings.

Tranship parcels and like traffic is a big factor in the passenger station, but the heaviest item there is the milk traffic. A recent census of a day's totals showed 1,004 churns received between 6 a.m. and 6 p.m.; but this is an ordinary average and is often exceeded. The principal consignees are the Eastern Counties Dairy Farmers' Co-operative Society and the

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MR. T. F. HOWLETT,
Stationmaster at Stratford.

Dairy Supply Company. On the Colchester route milk comes from the East Suffolk line and from the Norwich—Ipswich section, Diss, Tivetshall and Forncett being among the stations sending large supplies. There is also a heavy volume from Ongar, North Weald, Blake Hall and Epping. On both the main line and the Ongar routes special milk and stock trains are regularly operated.

Churns are mainly dealt with on platforms Nos. 4 and 5, both of which have road access adjacent to the Newtown booking office; otherwise the workmen's subway and the lifts require to be utilised.

In the angle between platforms 4 and 5 is a short carriage dock and behind this is a timekeepers' office where all traffic movements are recorded. Behind this again are the station buildings, including stationmaster's office, inspector's office and a public telegraph office, probably the busiest in East London and open all the year round. On the circulating area between platforms Nos. 4 and 5 are refreshment and dining rooms and a public drinking fountain. At the end of No. 4 is a telephone exchange serving the station area.

As already mentioned the jurisdiction of the Stratford stationmaster is extensive: he is responsible for the work of the carriage sidings and has control of the 14 signal cabins referred to. There is also the adjacent goods yard as regards traffic working. Consequently a considerable staff is associated with Stratford as follows:—

Station inspectors	3
Carriage inspectors (Responsible for work in carriage sidings)	3
Booking and parcels clerks	11
Stationmaster's clerks	7
Signalmen	62
Signal box lads	32
Foremen porters	5
Foremen parcels porters	2
Collectors	6
Ticket takers	3
Timekeepers	3
Porters	38
Lampmen	2
Guards	32
Porter and shunter guards	6
Yardmen (goods yard)	3
Shunters	19
Under-shunters	27
Couplers	9
Waiting-room attendants	3
Telephone attendants	3
Carriage cleaners	94
Casual carriage cleaners	88

Mr. T. F. Howlett has occupied the position of Stationmaster at Stratford for the last four years. He was educated at Carrow School, Norwich, and entered Great Eastern Railway service as a probationary clerk at Trowse in March, 1879. In June that year he went to Wymondham as parcels clerk; in February, 1880, as clerk at Dereham; and in June, 1881, came to Rectory Road as booking clerk, transferring in April, 1882, to Leytonstone in the same capacity. In May, 1888, he was removed to Stratford, also as booking clerk, remaining there until February, 1893, when he was appointed Southern District Relieving Booking Clerk, attached first to Woolwich and then to Bethnal Green Junction. In March, 1901, he was appointed stationmaster at Chadwell Heath, and after remaining there for seven years he was selected in May, 1908, for the post of assistant-stationmaster at Liverpool Street. In November, 1915, he came to Stratford as stationmaster.

The booking and parcels office staffs are under the immediate direction of Mr. Rudland as chief clerk, he being responsible for the commercial side. The commercial work of the goods and cattle depôt is under the direction of Mr. Bullivant.

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Locomotive and Train Working in the latter part of the 19th Century.

MIDLAND RAILWAY. [No. VI.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

THE year 1881 saw the last new engine constructed of the 2–4–0 type, and from 1882 onwards only 4–4–0 engines have been built for main line passenger service. The first of these built after this date were Nos. 1562 to 1581 and 1657 to 1666, constructed at Derby in 1882 and 1883, with 6 ft. 9 in. wheels, 18 in. by 26 in. cylinders, and 140 lb. pressure. The heating surface was considerably less than that of the 1327 class of 1877, being reduced to a total of 1,142 sq. ft., though the size of the firebox was the same. The weight was not very heavy, compared with the present day weight of a 4–4–0 engine, and was only 41 tons 13 cwt. in working order. These new engines were put to work as follows:—Nos. 1562 to 1565 went to Leicester to run principally to Manchester and sometimes to London, and remained on this work for nearly 17 years. Nos. 1566 to 1571 started on the "John Noble" expresses between Nottingham and London, but eventually found a more permanent home at Derby shed. Nos. 1572 to 1581 were fitted with the Westinghouse brake and sent to Carlisle for the main line expresses; they remained there until 1894 when they were transferred to Skipton, the Westinghouse brake, with which they were originally fitted, having been replaced by the vacuum several years previously. On one occasion No. 1573 on one of the downhill stretches of the Carlisle road, with a load of 220 tons, ran a distance of 10 miles in 8 min. 53 sec., with a maximum of 73½ m.p.h.

Nos. 1657 to 1666 were sent to Manchester and have been in this district ever since they were built in 1883, albeit during the last few years they have, like the others, been rebuilt out of all recognition. When new they had four lathe centre pops on the ends of the driving axles. For a few years Mr. Johnson cast the eccentric sheaves on the axles, and the centre pops were for the purpose of turning the sheaves up in place. A good many years afterwards, during one of the many interesting talks which I had with Mr. Johnson, he told me that this method of casting on the eccentric sheaves made the axle too stiff, "it would not give," and he therefore reverted to the older practice of keying them on.

The 1562 class, in spite of their smaller boilers, were very good engines and always showed excellent capabilities in the way of speed. 1570 ran from Kentish Town to Kettering in 78½ min. with about 85 tons, the booked time being 81 min. and the actual average speed 53.9 m.p.h.

No. 1567, with a similar train, covered the 51¾ miles from Kettering to Nottingham in 56½ min., a gain of 3½ min. on the booked time, giving a running average of 55 m.p.h. No. 1566, with 90 tons, ran from St. Pancras to Bedford at an average of 53.1 m.p.h. and gained 3¾ min. A brilliant performance by No. 1563 many years afterwards will be mentioned later. At the same time the 2–4–0 engines were doing some—for that day—very good running. The following is a log of the 10.10 a.m. Manchester express recorded in 1886 between Kentish Town and Bedford.

Engine No. 1499 (now 279), 2–4–0, 7 ft. wheels, 18 in. by 26 in. cylinders, load 160 tons.

		h.m.s.	Speed.
Kentish Town ..	Dep.	10.17.6	(due 10.16)
Post 7	Pass.	10.26.33	
,, 19	,,	10.40.56	
,, 25	,,	10.48.40	
Luton	,,	10.54.22	
Post 35	,,	10.59.40	54.5
,, 36	,,	11.0.39	61.0
,, 37	,,	11.1.35	64.2
,, 38	,,	11.2.27	69.2
,, 39	,,	11.3.18	70.6
,, 40	,,	11.4.8	72.0
,, 41	,,	11.5.0	69.2
,, 42	,,	11.5.54	66.6
,, 43	,,	11.6.48	66.6

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		h.m.s.	Speed.
Post 44	Pass.	11.7.41	67.9
,, 45	,,	11.8.33	69.2
,, 46	,,	11.9.24	70.6
,, 47	,,	11.10.14	72.0
,, 48	,,	11.11.14	72.0
,, 49	,,	11.12.0	64.2
Bedford	Arrive	11.13.15 (due 11.16)	

Four minutes were gained although the load was a fairly heavy one for that period. This particular engine, No. 1499, was one of the best on the line and had several very good records to its credit.

In 1884 a new departure was made in engines Nos. 1667 to 1676, which had 7 ft. coupled wheels, large cylinders 19 in. by 26 in., and Joy's valve gear. But they were undoubtedly let down by the very small boilers, which carried 140 lb. pressure and had but 1121 sq. ft. of heating surface, much too small for the 19 in. cylinders. Of these engines Nos. 1667 to 1669 were stationed in London to run the light Nottingham expresses, on which they performed very well, as they were undoubtedly very swift runners. But Nos. 1675 and 1676, which were fitted with the Westinghouse brake, being stabled in London for the much heavier 200-ton Scotch expresses to Leicester, were hopelessly overweighted and had not the ghost of a look-in against the two veterans, Nos. 818 and 819, which had been working these trains for some years. After a few months of hopeless struggle on the part of Nos. 1675 and 1676, Nos. 818 and 819 took up the work again and did it well. Of the other "Joys" Nos. 1671 and 1673 were for a long time at Nottingham on the London road, and the two remaining engines, Nos. 1670 and 1672, were kept at Derby to run to Leeds and Manchester.

In 1886–7 larger boilers with 1,261 sq. ft. of heating surface and 160 lb. pressure were substituted for the smaller 1884 boilers, and the engines were thereby greatly improved, but, nevertheless, they had, unfortunately for themselves, obtained a mediocre reputation with the men, of which they never got rid. I feel sure that, had they possessed these larger boilers to begin with they would have had a better chance. Moreover, one of the defects from which some of these engines suffered was too great "back pressure," and subsequently No. 1673, stationed at Nottingham for the London expresses, was supplied with a large blast orifice, after which its running was greatly improved. In 1896–1901 they were all practically broken up and renewed with link motion and piston valves, the frames also being new to accommodate a longer wheel base. Only the old bogies were used again.

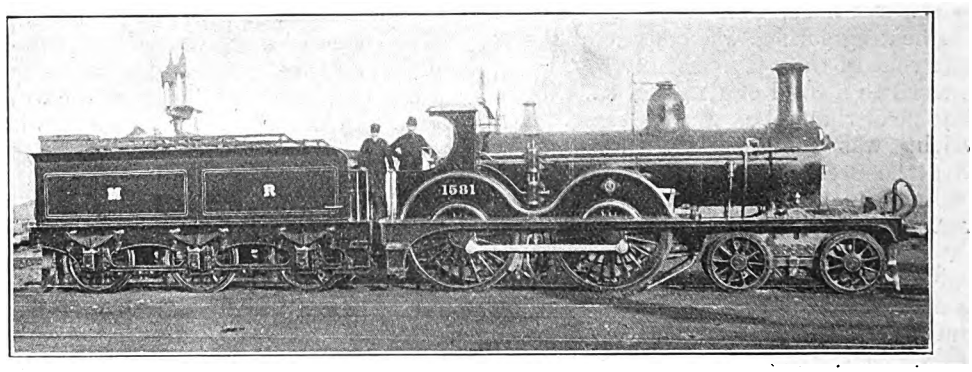

Photo.] [*Loco. Publishing Co., Ltd.*

4-4-0 LOCOMOTIVE No. 1581 (SERIES 1562—1581).

Designed by Mr. S. W. Johnson and built at Derby 1882–3. Coupled Wheels 6 ft. 9 in. diam. Cylinders, 18 in. by 26 in. Pressure 140 lb. per sq. in.
Nos. 1572—1581 were fitted with the Westinghouse Brake.

I have mentioned that the 1667 class were very fast-running engines. On one occasion No. 1668, with 110 tons, ran from Kentish Town to Kettering, 70¾ miles (including the curve through Bedford Station), in 77 min., an average speed of 55 m.p.h. Some of the intermediate

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speeds were very good. From the 13th post to the 71st post, 58 miles were covered in 60 min. and the 16-mile piece from the 33rd post to the 49th post took 13 min. 50 sec. Several miles were run in 48 sec., *i.e.*, 75 m.p.h. and two miles at 76 m.p.h. This speed was the highest reached on the Midland for many years within my own knowledge and was recorded in 1885.

But at the end of 1885 and beginning of 1886 the "Joys" were succeeded by other 4–4–0 express engines, the 1740 class. These engines of which there were 20 by the spring of 1887, also had 7 ft. coupled wheels, but the cylinders had the old diameter of 18 in. with a stroke of 26 in. The chief improvement was in the boilers, which were the first on the Midland to be of steel and to carry 160 lb. pressure. The heating surface was 1,261 sq. ft., of which the firebox provided the standard 110 sq. ft. These engines had the usual link motion, and were numbered 1738 to 1757. The last one, No. 1757, was exhibited at the Saltaire Exhibition of 1887 and was named *Beatrice* in honour of Princess Beatrice who opened the Exhibition.

Nos. 1738 to 1742, stationed in London, at once established a great reputation with the drivers, and it may truly be said that they have been amongst the best engines that ever ran on the Midland. The others were mostly distributed between Nottingham and Leeds sheds, except Nos. 1748 and 1749, which went to Carlisle, and No. 1757, which after the close of the Saltaire Exhibition, was sent to London. This engine afterwards worked for some years on the St. Pancras—Southend expresses when first introduced, and for a long time was stationed at Shoeburyness.

I have many records of the 1740 class. With No. 1740 and a load of 160 tons, the Kentish Town—Kettering run was done at 52.5 m.p.h., a gain of half-a-minute, but there were two bad relaying slacks. No. 1739, with 85 tons, ran from Nottingham to Kettering, 51¾ miles, in 56 min. 50 sec., a running average of 54½ m.p.h. On another occasion No. 1740 made the following fast timing on a down Bradford express, with 90 tons, from Haverstock Hill, where the train had been stopped 2¼ min. by signals:

			Speed, m.p.h.
Haverstock Hill ..	Start	3.10.33	
St. Albans	Pass	3.34.21	
Luton	,,	3.45.20	
Post 31	,,	3.46.3	
,, 35	,,	3.50.8	59
,, 36	,,	3.51.2	66.6
,, 37	,,	3.51.53	70.4
,, 38	,,	3.52.44	70.4
,, 39	,,	3.53.34	72
,, 40	,,	3.54.22	75
,, 41	,,	3.55.12	72
,, 42	,,	3.56.4	69.2
,, 43	,,	3.56.55	70,4
,, 44	,,	3.57.46	70.4
,, 45	,,	3.58.36	72
,, 46	,,	3.59.26	72
,, 47	,,	4.0.16	72
,, 48	,,	4.1.7	70.4
,, 49	,,	4.2.1	66.6
Bedford	,,	4.2.57	
Sharnbrook Summit	,,	4.16.7	
Wellingboro' ..	,,	4.21.27	
Kettering	Arrive	4.29.8	

The above run was made in the face of a strong wind and snowstorm. It may be of interest at this point to mention that the 1740 class do not now exist, as the present renewals are practically new engines. Of all Mr. Johnson's 4–4–0 engines of 1876 to 1901 only some of the earliest 1876–7 engines (now numbered between 300 and 327) are in existence in their original form. The 1562 class took the new numbers, 328 to 357, and from 1904 to 1907 all the 4–4–0 engines were rebuilt with large boilers and the modern alterations. At this time, however, the engines were genuine rebuilds, *i.e.*, the old frames and motion were retained. But since 1909 nearly all the 4–4–0 engines, Nos. 328 to 562, have been completely renewed with new frames and motion and Belpaire boilers, so that only the bogies, and perhaps the coupled wheels of some of them, remain of the originals, and they are therefore almost completely new without any genuine claim to be rebuilds of Mr. Johnson's engines, which are now, in reality, completely extinct.

A correspondent recently sent a small photograph of a little 0–6–0 saddle tank contractor's engine, No. 2069A and asked the origin of it. As it was an engine with a somewhat curious history something may be said about it. Once upon a time there was an iron company somewhere in the midland counties, which worked hard but did not make much money in the process, owing possibly to a lack of worldliness. This iron company was the

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possessor of the small engine in question, which had been built by The Hunslet Engine Company in 1880. The firm despatched a certain amount of iron by rail, and the Midland was the line which handled the traffic. But, so the story went, the bill for the carriage of the iron was not always paid, owing to financial difficulties, and the indebtedness of the iron company to the Midland Railway began to mount up. The story further relates that one night in 1884 or 1885 a bailiff put in an appearance accompanied by other myrmidons, some of whom had evidently been carefully selected owing to their knowledge of the little ways of a locomotive, and whilst the bailiff surveyed the scene with a sympathetic smile the others "pinched" the small contractor's engine and took it away. Very shortly afterwards, strange to say, it was found at Derby with the Midland number 1697 upon it. Eventually it was renumbered 2069A and finished its days as pilot shunting engine at Manningham (Bradford) engine shed, being broken up in January, 1903.

There were and are certain very interesting mail train services on the Midland that merit some description. Perhaps the most important was the 7 p.m. mail from Bristol to Newcastle, with the corresponding train in the opposite direction. The 7 p.m. had two mail vans of the travelling post office type, and frequently a third was added. At one time I believe these belonged to the Midland, but afterwards they were lettered M. & N. E., showing that the North Eastern had entered into part ownership of them. They were the only coaching stock owned jointly by these two companies.

The nightly mail train movements may be said to have been initiated by the Great Western with a train that left Penzance at about noon with a mail van for Bristol, which was reached at 6.50 p.m. At Bristol the mails were transhipped to the Midland travelling post offices, which left for the north at 7 p.m. and travelled *via* Worcester. At Gloucester the train picked up the mails from the Great Western Railway South Wales line; these had also been

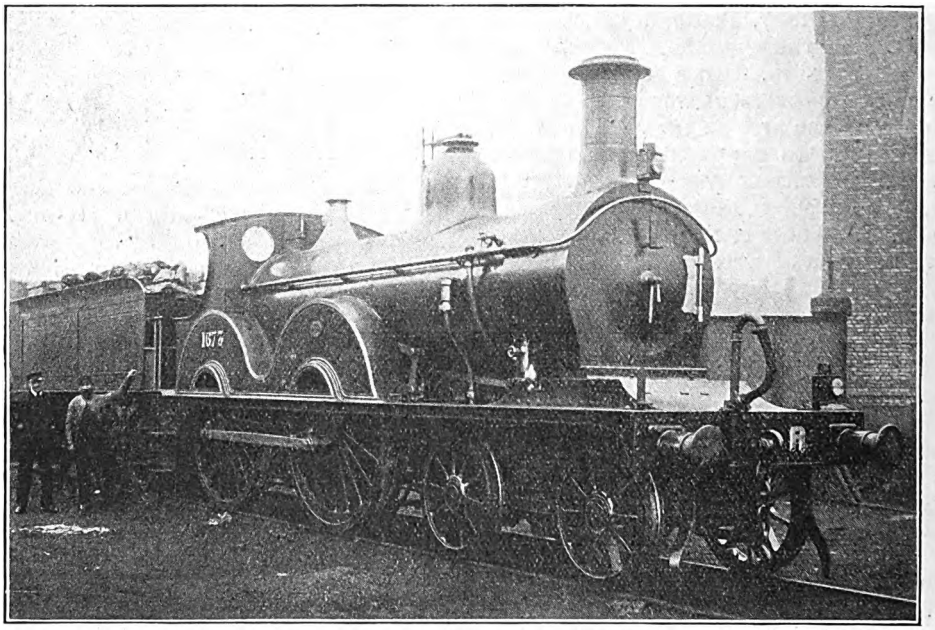

Photo.] [*Loco. Publishing Co., Ltd.*

4-4-0 ENGINE No. 1673 (SERIES 1667—1676).

Fitted with Joy Valve Gear. Designed by Mr. S. W. Johnson and built at Derby in 1884. Coupled Wheels 7 ft. diam. Cylinders, 19 in. by 26 in. Pressure 140 lb. per sq. in. From 1886 new boilers with 160 lb. pressure were provided.

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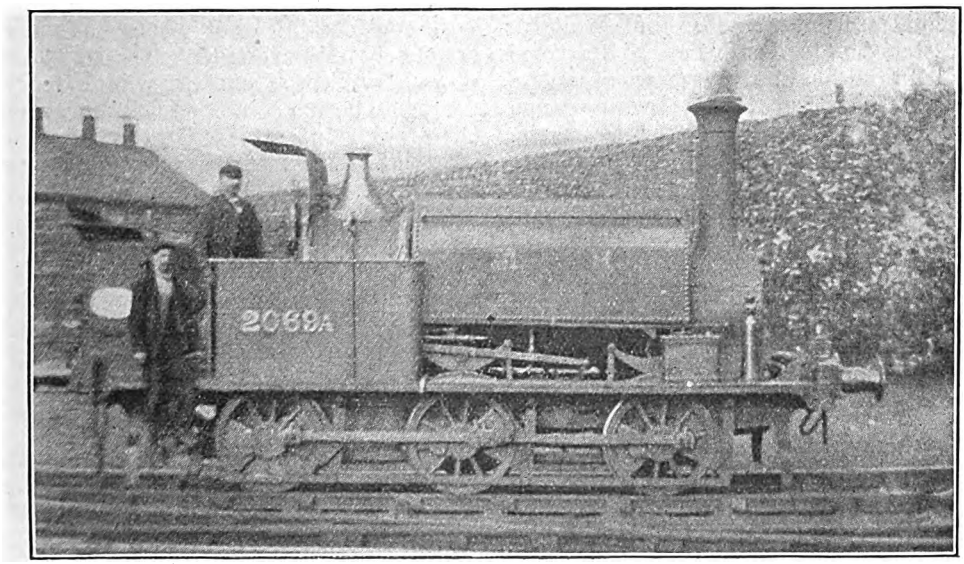
conveyed in a travelling post office, which then started from New Milford. At Birmingham the mail train used to stand for more than an hour before proceeding to Tamworth, and a portion of the sorted mails were sent on in advance in a short train and special van, which left New Street at 10.3 p.m. for Tamworth only, and preceded the 8 p.m. Scotch express from Bristol, which then left Birmingham at 10.40 p.m., the Newcastle mail train itself following at about 11.20 p.m. Tamworth may be described as the hub of the mail train universe, for here the Midland line crosses the London and North Western main line from London to Crewe, the station of the latter railway being situated immediately underneath that of the Midland. A lift and a "shoot" are utilised for the transfer of mails, of which the Bristol mail disgorged a vast quantity, to be taken in charge by the London and North Western Railway trains which left Euston at 8.25 p.m. (Irish) and 8.50 p.m. (Scotch Limited). In more modern times the 8.30 p.m. "Postal," a self-contained mail train, was substituted for the mail vans conveyed on the older London and North Western expresses. In its turn the Midland train received a new lot of mails from the North Western trains and departed for Normanton *via* Derby and Sheffield. At Normanton a fresh cross-country mail connection was made, for the Lancashire and Yorkshire brought in from Huddersfield the North Western mail vans and coaches forming the "Bangor mail," which had come from North Wales *via* Crewe and Stockport. The Bangor mail at that time ended its journey at Normanton, and its contents were in their turn transferred to the Bristol–Newcastle train, and also a portion for the Leeds mail. At Normanton we lose sight of our train, for from this point to York and Newcastle it came under the direction of the North Eastern Railway, on which line it made other connections with a Leeds and Hull mail train.



0-6-0 TANK ENGINE No. 2069A. (*From an old Photograph.*)

An equally important connecting mail train was that which left Lincoln at 8.10 p.m., also with two heavily-loaded travelling post offices. This train took charge of all correspondence from Lincolnshire and travelled *via* Newark, Nottingham, Trent and Derby to Tamworth, where it terminated. It made a connection at Derby with the Bristol–Newcastle mail, and at Tamworth with the previously-mentioned mail trains of the London and North Western Railway.

When I first remember it this train was

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always worked through by a Lincoln 2-2-2 single engine. When these engines were broken up, 2-4-0 engines were substituted, for Tamworth boasts of an old-time turntable which will not accommodate 4-4-0 engines. During the last few years prior to the war, however, a 4-4-0 engine was used on the mail from Lincoln, but this engine, went through to Birmingham. This "Lincoln mail" is now a heavy 240-ton train, and is timed with many stops at such fast intermediate speeds that its locomotive problem is not an easy one.

The third Midland mail train was the one which left St. Pancras at 8.30 p.m. (afterwards 8.40) and picked up a varied assortment of correspondence from all principal stations, *e.g.*, Luton, Bedford, Leicester, &c., for Derby, where it arrived at about midnight in time to dump its contents upon the already overburdened post office sorters of the Bristol–Newcastle train. From Derby it formed the Leeds portion of the Bristol-Newcastle mail, and was detached at Normanton. The above trains have altered very little and were very nearly the same in 1914 as they were at the period of my description. The only important change, as far as I know, is that the London and North Western Railway Bangor Mail, which has forsaken Normanton, now goes direct to York *via* Leeds. But this does not concern the Midland to any great extent.

The Midland and North Eastern have also substituted large bogie mail vans for the original six-wheeled ones of the "Eighties."

The table on this page shows alterations in maximum booked speeds which had taken place in 1887 and may be compared with those given in the previous table for 1881. Certain runs remained as in 1881 and are not given again. The 1890–1 increases are also stated; these resulted from an all round acceleration which took place from 1888.

The year 1888 saw the Midland confronted with severe competition on two sides. This was the year of the first of the Scotch train races, and although these sporting events were confined to the East and West Coast routes, the Midland was compelled to accelerate its Scotch trains very considerably or it would have been hopelessly left in the rear. The 10.35 a.m. down day Scotch express, which for 12 years had been a combined Edinburgh and Glasgow train, was separated into two portions, of which the Glasgow portion ran as follows:—

Miles.				Speed.
	St. Pancras	..dep.	10.30 a.m.	
99¼	Leicester	..arr.	12.25 p.m.	52
	,,	..dep.	12.29 p.m.	
* 185¼	Normanton	..arr.	2.13 p.m.	49.6
	,,	..dep.	2.38 p.m.	
221¼	Skipton	..arr.	3.24 p.m.	47.0
	,,	..dep.	3.27 p.m.	
308	Carlisle	..arr.	5.16 p.m.	47.8

This was really a very fine train. The half-hour allowance for dining at Normanton was cut down to 25 minutes.

Between.	Distance, miles.	Speed, m.p.h. 1887.	Speed, m.p.h. 1890.
London and Bedford	49¼	49.8	52.3
Bedford and Leicester	49¼	49.5	49.5
London and Kettering	72¼	52.2	52.2
Kettering and Nottingham	51¼	51.7	51.7
London and Nottingham	123¼	—	52.3
Bedford and Wellingboro'	15¼	44.3	48.9*
Leicester and Trent	20¼	46.2	51.9
Sheffield and Cudworth	18¼	46.8	46.8
Sheffield and Normanton	28¼	47.9	49.3*
Sheffield and Leeds	39¼	48.3	47.4*
Derby and Marple	48¼	44.3	47.2
Skipton and Carlisle	86¼	45.7	48.3
Hellifield and Carlisle	76¼	44.8	48.3*
Derby and Manchester	62¼	43.7	43.7
Derby and Birmingham	42¼	—	46.9
Leeds and Skipton	26	44.6	45.9

* In 1891.

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The Edinburgh train left St. Pancras 10 minutes later and travelled *via* Nottingham as follows :—

Miles.				Speed.
	St. Pancras	..dep.	10.40	51.3
123¾	Nottingham	..arr.	1.5	
	,,	..dep.	1.9	47.8
202	Leeds ..	..arr.	2.47	
	,, ..	..dep.	3.12	40.25
238¼	Hellifield..	..arr.	4.6	
	,, ..	..dep.	4.10	47.3
314¾	Carlisle ..	..arr.	5.47	

It passed the Glasgow train (standing in Normanton Station) and ran in front of it between Normanton and Leeds, where the Edinburgh passengers were also allowed 25 minutes for dining.

But the year 1888 also saw a much more serious competition to the Midland in the opening of the new route of the Great Western and London and North Western Railways from Bristol through the Severn Tunnel. This not only affected the Midland Scotch service from the West of England, but also beat its Manchester and Liverpool connections. And even Leeds did not escape, for the competing companies had the audacity to run a through carriage between Bristol and Leeds on one train in each direction.

Writing now from my recollections of this period I do not think that the Midland bestirred itself sufficiently to meet the new competition, more especially that part of it between Bristol and Manchester. It must, however, be admitted on its behalf that the Midland had a very difficult problem to face, for the Great Western controlled all the bookings west of Bristol, and the unwary passenger who wanted to go anywhere was—as far as it could be done—propelled through the Severn Tunnel, sometimes to his disadvantage.

I am indebted to Mr. L. B. Hewitt of Bath, for pointing out an error in my account on page 90 of the August issue relating to the Somerset and Dorset Railway. The disaster at Radstock occurred on August 7, 1876, after the Midland and London and South Western Companies had jointly leased the Somerset and Dorset lines on November 1, 1875, and, therefore, the accident, which I wrongly stated to have taken place in 1875, was not the cause of the termination of the independent existence of the small company.

I may add, however, that when the accident occurred the lease was hardly more than nominal and did not receive Parliamentary sanction until 1876. The Somerset and Dorset still remained under its old management, and the defective signalling and traffic arrangements were the same as before. It was after the accident that the new era of the Somerset and Dorset was inaugurated by the joint leasing companies, and not before it was time!

(*To be continued.*)

Locomotive and Train Working in the Latter Part of the Nineteenth Century.

Railways already dealt with in the "Railway Magazine" by Mr. E. Ahrons are:—

L. & N.W.: Jan., Feb., March, May, 1915. (All out of print.)
GREAT NORTHERN: June, July, 1915. (Both out of print.)
MANCHESTER, SHEFFIELD & LINCOLNSHIRE: Aug., Sept., Oct., 1915. (Aug. and Oct. out of print.)
GREAT WESTERN: Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916. (Dec., Jan., Feb., June, July, and Aug. out of print.)
GLASGOW & S.W.: Sept., Oct., 1916. (Sept. out of print.)
GREAT EASTERN: July, Aug., Sept., Oct., Nov., Dec., 1918. (Dec. out of print.)
NORTH EASTERN: Nov. Dec., 1916. Jan., Feb., March, April, May, 1917. (Nov., Dec., 1916, Jan. and Feb., 1917, out of print.)
SOUTH EASTERN: June, July, Aug., 1917.
LANCASHIRE AND YORKSHIRE: Sept., Oct., Nov., 1917.
LONDON, CHATHAM & DOVER: Dec., 1917. Jan., Feb., 1918.
CALEDONIAN: March, April, May, June, 1918.
LONDON BRIGHTON & SOUTH COAST: Jan., Feb., March and April, 1919. (First three out of print.)
MIDLAND: May, June, July, Aug., Sept., 1919.

All parts still in print are One Shilling each.

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Mr. R. L. Wedgwood,

Deputy General Manager, Chief Goods Manager, and Passenger Manager, North Eastern Railway.

Mr. R. L. Wedgwood has been appointed Deputy General Manager, North Eastern Railway, in succession to Sir Eric Geddes. In addition he will continue to act as Chief Goods Manager and Passenger Manager. Born in 1874, Mr. Wedgwood graduated at Cambridge University and entered North Eastern Railway service under Sir George Gibb in 1896. In 1898 he was transferred to West Hartlepool and served in the Dock Superintendent's office for some years, latterly as Assistant Dock Superintendent. He returned to York in 1901 as an assistant in the office of the General Traffic Manager. On the reorganisation of the staff in 1902, Mr. Wedgwood was appointed District Superintendent at Middlesbrough, but in 1904 left that department to succeed Mr. C. N. Wilkinson as Secretary to the company. This position he held only for a short time, being at his own request re-transferred to the Traffic Department.

Photo.] [*Elliott & Fry.*

MR. R. L. WEDGWOOD, C.B., C.M.G.

In 1905 he was appointed Northern Divisional Goods Manager, with headquarters at Newcastle. In connection with a rearrangement of the work of the Goods Department he was, on October 1, 1911, appointed Assistant Goods Manager, with headquarters at York, and shortly after, on the appointment of Sir Eric Geddes to be Deputy General Manager, he became Chief Goods Manager. In February, 1914, consequent on the retirement of Mr. Philip Burtt from the position of Passenger Manager, he was also appointed to control the work of the Passenger Department, while retaining his position as Chief Goods Manager.

At an early period in the war Mr. Wedgwood volunteered for army service, and with the rank of Major, R.E., acted as D.A.D.R.T., in the Transport Establishment in France; but in July, 1915, he was transferred to the newly-formed Ministry of Munitions, his rank being that of temporary Lieut.-Colonel. In October, 1916, he was appointed Director of Docks under the Director-General of Transportation in France, with the rank of temporary Brig.-General. On June 4, 1917, he received the C.M.G., and in the following June the C.B. Mr. Wedgwood during his time in France also received the decoration of an Officer of the Legion of Honour, and a Commander of the Belgian Order of the Crown. He returned to the North Eastern Railway in June, 1919.

At a recent meeting of the Goods Managers' Conference of the Railway Clearing House Mr. Wedgwood has been elected Chairman of the Conference for the year 1920.

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A Peep into the Future.

ELECTRIC TRACTION.—No. III.

By C. SYLVESTER, A.M.I.E.E.

REFERRING to sub-station equipment there will, of course, be the usual step-down transformers. The low tension side of the transformer will be connected to the main bus bars of cellular type switch-gear cubicles. These, in addition to the main switches, will contain the necessary current and potential transformers for connection to the instruments fitted upon ordinary slate or marble panels. The design of the switchboard should receive careful consideration to guard against breakdown, and auxiliary apparatus should be fitted to cope with a breakdown should one occur.

As an example we will take the case of the large main oil switch, which will be fitted between the high tension transmission lines and the transformers. No matter how well an oil-switch is designed, and although its efficiency on test proves that it is equal to the work it has to perform, it must be remembered that it cannot be guaranteed to perform this work for an indefinite period. Contacts are sure to become bad, and the mechanical portions of the switch are bound to become more or less defective and in need of adjustment through fair wear and tear.

To overcome this difficulty, or at least to enable the working switch to be overhauled without shutting the system down, a duplicate main switch should be connected in parallel with the working switch. This, when at the off position, would be carrying no current; yet, in case of a breakdown to the working switch, it may be switched in before the defective switch is taken out of service. Throughout the whole of the design of the traction plant and equipment these precautions should be carefully considered, because breakdowns must not only be provided against but quickly overcome when they do occur.

With this end in view it would be in the interests of efficiency if the cellular type cubicle equipment were duplicated, or the circuits interconnected to enable a spare cell to be connected up in substitution, in case of any portion of the switch or operating gear giving out. In some large power houses at the present time some of the bus bars are duplicated, but this is not so important as providing against the breakdown of the switch-gear and apparatus between the main bus bars and each rotary converter.

The subject of rotary converters is not a serious one. As it is suggested that the direct current side of the machine should deliver current at a pressure of 800 volts, instead of 600 volts as now used, additional precautions must be taken when insulating the armature coils. This matter will receive consideration, but the manufacturers are quite alive to the requirements, and machines will be supplied which are equally reliable as those already in use. The number and size of rotary converters installed will depend upon the capacity of the plant. Unlike the generating station, it would appear to be a great mistake to instal as large machines as is possible.

We will suppose that a sub-station under full load will deliver 16,000 kilowatts. It would be much better to erect eight 2,000 kilowatt machines, with one machine to be used as a spare, than four 4,000 kilowatt machines, with one machine as a spare. In the former case, if two machines are shut down and the spare machine is on the bars, there is only a loss of 2,000 kilowatts. In the second case, if two machines are shut down through any reason and the spare one is switched in, then there is a loss of 4,000 kilowatts, or 25 per cent. of the total plant.

The efficiency of transformation between alternating current and direct current in large and small machines is almost the same. Thus there is a risk with nothing to be gained in compensation, in fitting too large rotary converters in the sub-station.

Before dealing with the actual traction equipment we will consider the track,

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that is, from the live rail and bonding point of view.

There is no doubt that a third rail will be used, as trolleys or any overhead system of collecting current will be far too complicated to receive a second consideration. One can realise the difficulty when such junctions as Carlisle, Crewe and Clapham Junction are considered. Apart from the enormous size of the trolley arms which would be required, the crossing of these trolleys from one wire to another would be almost an impossibility.

Even with the third rail the matter will be far from simple. It will mean that the live rail will have to be fixed a few inches above the traction rails so that the collector shoes will not touch them when the coaches are passing over them.

The present system of copper bonding between rails cannot very well be improved upon, beyond the fact that larger bonds will have to be used. It would be as well, however, if the contact area between the bond heads and the rail were examined to see if the additional amount of current can be carried without overheating.

A great improvement will be necessary in the design of the actual connections between the lugs from the direct current supply cables and the live rail. The present method consists of a large brass lug into which the cable is sweated. The face of the lug is made to fit on the web of the rail, the latter being ground to make as good a contact as possible. This contact will last for some time, but, owing to atmospheric conditions and the subsequent dampness and oxidisation taking place between the contact surfaces, bad contact is eventually made, the lug commences to get hot and the solder runs. Now that electric arc welding has reached such an efficient stage it would appear that larger lugs welded to the rail will make an excellent job of what is now a nuisance.

The present design of collector shoes has given every satisfaction in the past, and it does not seem possible at the present moment to improve upon them. They will, of course, have to be much larger and their number will have to be in proportion to the weight of the respective units. As far as wear and tear is concerned, it is strange, although true, that ordinary cast iron shoes will wear much better and longer than those which are slightly case-hardened through chilling.

Fuses between the collector shoes and the motor controller will have to be considered from a breakdown delay point of view. It would not be good practice to do away with these fuses altogether, since they are the only protective device between the live rail and the unit. Again, if anything happened to a unit which, under present conditions, would blow these fuses, if they were discarded, the load would be thrown upon the section circuit breaker, which would, in all probability, trip and so shut down the complete section.

The remedy suggested is a duplicate fuse with a switch which may be quickly thrown from the blown fuse contacts to those of the duplicate fuse. If such an arrangement is adopted it will not be necessary to stop the unit at all. When any fuse has blown it will be readily noticed by the non-reading of the ammeter connected to it, and by the increased reading on the ammeters connected to the other motors as the load is thrown upon them.

Probably the most important item to receive consideration will be the provision for the replacement or substitution of good motors for those which may break down. The causes of breakdown are various, but the most prominent ones are due to hot bearings, with the result that the Babbitt's metal runs and the armature commences to rub upon the pole pieces, thus stripping the banding wire. It can be realised that a breakdown to a motor will mean taking the unit out of service unless provision is made for the mechanical disconnection of defective motors and the substitution of spare ones.

In the system adopted by the London and South Western Railway there are two motor bogies, or two motor coaches, to each three coach unit. Each bogie carries two motors of 275 h.p. each. The motor drives, by a pinion, a spur wheel which is connected to the wheel axle. If a motor breaks down there is nothing for it but to take the unit, or at least, the motor coach, to Wimbledon Park or one of the other depôts in order that the coach may be lifted to enable the defective motor to be changed.

This is a condition of affairs which cannot be permitted in the traction scheme of the future. One can imagine the

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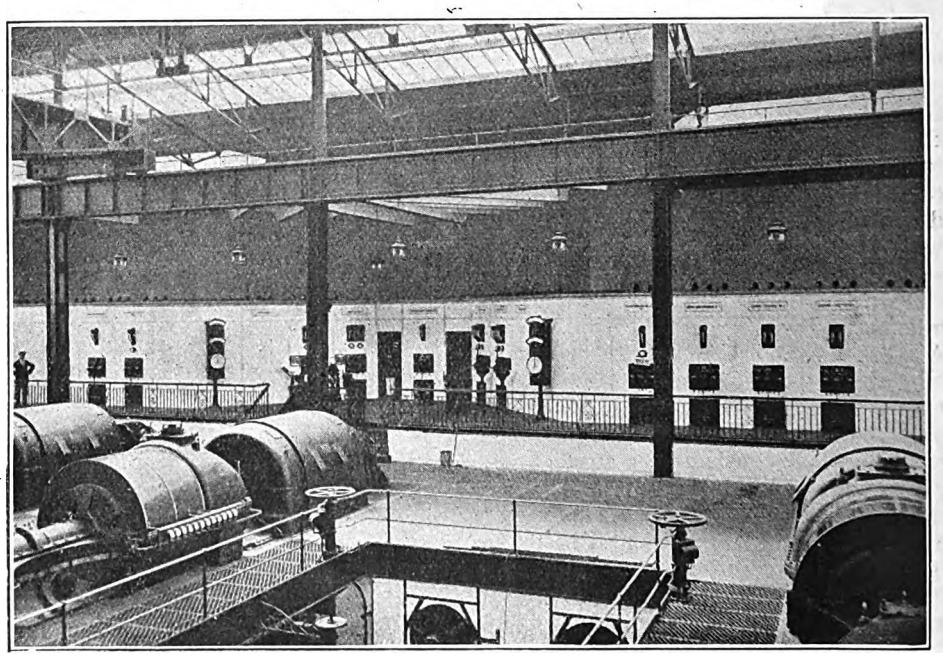
consternation of the passengers and the officials if an express train travelling say, from Euston to Carlisle, has to be shunted into a siding pending the disconnecting of the defective motor coach.

It should not be a difficult matter to fit three motors to each bogie and allow one of these to act as a spare. Instead of the pinion being keyed direct upon the armature shaft, it could be fitted upon a short shaft the other end of which may be provided with a coupling. Then, if a coupling is fitted upon the armature shaft, and the two couplings are bolted together, it should not be a difficult matter to slip these bolts and fit them in the couplings of the spare motor if required. As far as the electrical connections are concerned, change-over switches could place the spare motor across the controller connections.

Another item which must not be overlooked is the lubrication system for the motors. The present method of worsted and cotton waste, although satisfactory for short distances, will not be much use for long journeys. Moreover, experience shows that with the cotton system the shaft gets more oil if the motor is running in one direction than it does when the direction of rotation is reversed.

The writer once carried out some experiments in this direction, and it was found that if the motor was running in the direction of rotation against the port which contains the packing, the oil was forced to the top of the packing and sometimes overflowed. When the direction of rotation was reversed, the top of the packing was quite dry and the motor shaft was getting much more oil. It would appear that the ideal system of lubrication would be to adopt a method similar to that used upon an ordinary steam turbine. Here, a pump forces oil from a tank to the bearings, and it returns through various passages to the tank again.



CANAL SAN FERNANDO POWER STATION: CENTRAL ARGENTINE RAILWAY.
General View showing Generators and Main Switch Board.

There does not appear to be much difficulty in fitting a pump on each motor bogie to supply oil to the three motors. Only one oil tank would be necessary, and this could be constructed in such a manner that air would rush through tubes in a similar manner to an ordinary oil cooler. This should keep the oil very cool and only a few degrees above that of the surrounding temperature. It mus

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not be forgotten, however, that as the motors are likely to be reversed there should be two pumps fitted, one for each direction of rotation.

The size of motors will, of course, depend upon the service for which they are required and upon the length of journey they have to make. It is fairly safe to assume that traction motors of the future will be divided into these classes :—

1. For long distance work.
2. For intermittent work. (Such as are now used on the London and South Western Railway).
3. For slow goods work.

Considering these items in rotation, the motors used for long distance work will have special features in design which will meet the requirements of continuous running without excessive overheating. They must be much larger than those used for intermittent work, since much more copper must be used in the construction of the fields and the armature. Advantage, no doubt, will be taken of the forced draught which will be available, to dissipate the majority of the heat generated. Probably the yoke of the motor will be provided with air ducts through which the forced draught will pass.

Intermittent ratings motors, as now used, are entirely satisfactory and it is hardly possible to improve upon their design and efficiency at the present time. The journeys they will be called upon to make will be much longer than those they are performing at present, but as their design is on the safe side no anxiety will be experienced from this cause.

Regarding goods traffic, slow speed high-power motors will be required for this purpose. The design of motors for all purposes has been so greatly improved during the past two years that it is certain that motors which will meet the trying requirements of goods work will be easily designed. The motors will have to be contained on the bogie at the front end of the train, since it will not be possible to connect jumpers between each wagon. This will really make the motor unit a kind of electric locomotive. Such a locomotive is not new by any means; the Waterloo and City Railway, London, have two electric locomotives which have been used for a number of years for shunting purposes. At times they are to be seen on the London and South Western Railway system bringing defective units to the repair shops.

Regarding the contactor equipment for starting the motors, there is no doubt that the present remote-control system will be used. This method will enable the contactor equipment of the whole of the motor coaches to be placed under the control of one motor man in the front portion of the unit. The sequence of the closing of the contactors will, of course, be governed by the time limit relays, similar to those which have proved so satisfactory in present electrification systems.

There may be some trouble experienced due to the inability of the resistance grids to stand heavy currents for a much longer period than is required for small units. This will be necessary, as it will not be possible to start a long heavy express unit so quickly as the small unit.

There is one important item which should receive consideration, and this is in connection with braking. Although compressed air has been so satisfactory it may be considered desirable to consider the adoption of magnetic brakes for this purpose. Here, an ordinary solenoid will pull the brake shoes on to the wheels and, since the current for this purpose will be obtained from the live rail, and not by a method of regenerative control, the solenoid will remain energised until it is necessary to start the motors.

There is very little more to be said concerning the probable design of traction equipment. There will, of course, be a few set-backs when the equipment is placed in service. That those set-backs will be overcome there is not the slightest doubt. Care, however, as I have pointed out throughout this series of articles, should be taken to prevent equipment being installed which is likely to cause trouble.

Repair depôts should be erected in convenient positions throughout the whole of the traction systems, and these should be manned with persons who have been trained to tackle an electrical breakdown in a practical and efficient manner.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN.

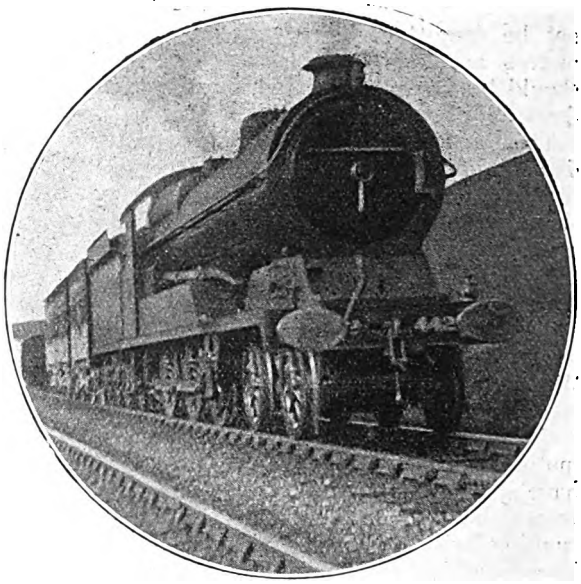

Photo.] [*K. A. C. R. Nunn.*

GREAT CENTRAL RAILWAY.

Main line goods train near Woodford Junction.
4-6-0 superheater locomotive, No. 442.

IN my "Century" article of exactly a year ago I was incautious enough to remark, while deploring my lack of personal acquaintance with Irish express locomotive running, that it was not, perhaps, strictly speaking, covered by the title above. Taking me to task for this indiscretion an Irish reader calls attention to the fact that if Ireland is not a part of Great Britain, it is certainly included in the British Isles. In acceptance of this correction and in token of penitence, I am at last able—with, I may add, the greatest pleasure—to give some first-hand impressions of the fine work performed on the two leading Irish lines—the Great Southern and Western and the Great Northern Railways. For the necessary facilities afforded me for doing so I am indebted to Mr. E. A. Neale, the General Manager of the former company, and to Mr. G. T. Glover, the Locomotive Engineer of the latter, but I may add that no special arrangements were made on the days on which I travelled, nor were the drivers previously communicated with, so that the journeys about to be described are absolutely representative of ordinary performance. In order to afford a comprehensive idea of the running I have tabulated the runs in detail, the Great Southern and Western journeys consisting of two return trips between Dublin and Cork, and the Great Northern trips of two from Dublin to Belfast and Back. Following alphabetical order we will deal with the latter first.

The Great Northern main line is not an easy one from the grading point of view. It has four principal summits—at the 16, 37¼, 63½ and 96 mile-posts out of Dublin, where the levels attained are 237, 327, 522 and 298 ft. respectively above sea-level—together with subsidiary summit points at the 3¼ and 52 mile-posts. To the 3¼ post the worst rise is at 1 in 177–223 between 1 and 2¾ miles, while from Raheny there is one mile falling at 1 in 200. To mile-post 16 there is a 3½-mile ascent, of which 12¾ to 15½ average 1 in 170; the 2 miles fall thence to Skerries includes 1⅝ miles at 1 in 150. From Skerries ensue undulations with a falling tendency to Laytown, and from there to Drogheda the line ascends almost uninterruptedly at 1 in 300. At 1¼ miles beyond Drogheda commences the climb to mile-post 37¼, 4⅜ miles long, the first 1½ of which are at 1 in 167, and the remainder at 1 in 177; from the summit to mile-post 42¾ is generally at 1 in 195–198, with a subsequent mile (44½–45½) down at 1 in 177, and another (47½–48½) at 1 in 200,

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the intervening stretches being level. From 50–52 miles is a sharp rise (1 in 180–167), and a drop of 1½ miles at 1 in 160 (52–53½) brings us almost into Dundalk.

Then comes *the* test of strength. The actual climb up to the ridge between Slieve Gullion and Clermont Carn lasts from mile-post 55 to mile-post 65½; from 55 to 56¾ it is mostly at 1 in 145 to 200; from there to 59½ it is entirely at 1 in 100 (save a brief stretch at 1 in 91); from 59½ to 62½ (Adavoyle Station) it varies from 1 in 100 to 1 in 142; and, finally, after ½-mile downhill "breather" at 1 in 140, and ¼-mile level, we have 2¼ miles at 1 in 135–120 to the summit. From 65½ to 70½ miles is a drop mainly at 1 in 100–112; after ¾-mile of easier grades this descent is renewed at 1 in 110–150 to mile-post 74. Thence follow gentle undulations to Portadown, with intermediate service slacks at Poyntzpass and Scarva. In conclusion there is a rise from Portadown to mile-post 96, broken only by a brief descent between mile-posts 90 and 91; from 88–90 it is mostly at 1 in 196–370, and from 91 to 96 at 1 in 227–291; 2 miles' fall thence at 1 in 148–248 are succeeded by 9½ undulating miles to mile-post 107½, and an ultimate fall of 5 miles into Belfast, 107½ to 111 being mostly at 1 in 198–291. So much for the gradients.

The journeys included one in each direction on the "Limited Mail" expresses, which have the fastest timings—2½ hours in each direction—but carry the lightest loads, and one each on the 9.0 a.m. from Dublin to Belfast (2¾ hours with 5 stops), and 2.45 p.m. up (3 hours with 5 stops). Unfortunately I had no opportunity of travelling on the 3 p.m. *ex*-Dublin, which, although not the fastest, is probably the hardest of all the expresses to work on account of its load. In almost every instance the engine employed was one of Mr. Glover's handsome superheated 4–4–0 class, named after Irish mountains. It is only fair, by the way, that while I am thus describing the work of this efficient express locomotive stud, which alone has rendered these fast timings possible, due credit should be given to the General Manager of the Company—Mr. J. Bagwell—for the institution of so excellent a service of trains between the two leading Irish cities. In reality the service planned is better and faster than that at present in operation, but certain curtailments and slowings have been rendered necessary for the time being owing to war conditions.

Times on the various runs are fully set out in the tables, and it is only necessary, therefore, to specify the maximum and

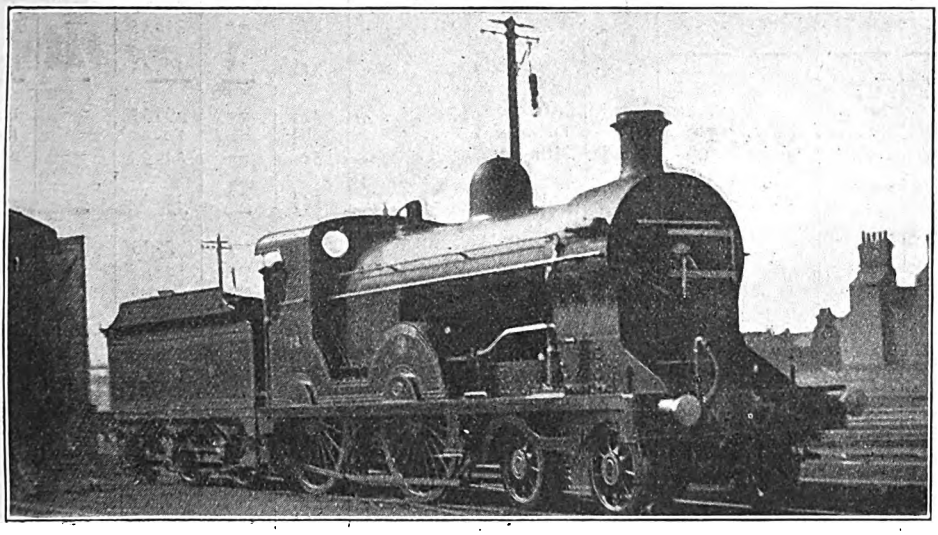

Photo.] GREAT NORTHERN RAILWAY (IRELAND). [*J. Macartney Robbins.*

4-4-0 superheater locomotive, No. 174, "Carrantuohill."

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GREAT NORTHERN RAILWAY (IRELAND): DUBLIN—BELFAST.

UP.				DIRECTION.		DOWN.			
4.25 p.m. 172 Slieve Donard		2.45 p.m. 174 Carrantuohill		Train. Engine No. Engine Name.		7.25 a.m. * 173 Galtee More.		9.0 a.m. 172 Slieve Donard	
Sched	Actual.	Sched.	Actual.	Distance.	Stations.	Distance.	Sched.	Actual.	Sched.	Actual.
min.	m.s.	min.	m.s.	miles.		miles.	min.	m.s.	min.	m.s.
38	37.20	40	40.15	112½	Amiens St.	0	0	0.00	0	0.00
—	32.00*a*	—	34.25*a*	108¾	Raheny	3¾	—	7.30	—	8.00
—	26.00	—	28.00	103½	Malahide	9	—	12.55	—	13.45
—	19.10	—	20.35	96½	Mile-post 16	16	—	20.20	—	21.25
—	12.35	—	13.15	90¾	Balbriggan	21¾	—	26.05	—	27.15
—	6.55	—	7.20	85½	Laytown	27	—	31.15	—	32.25
28	27.30	32	31.00	80¾	Drogheda	31¾	38	36.45	39	38.10
—	21.20	—	24.10	75¼	Mile-post 37¼ ..	37¼	—	9.55	—	10.25
—	13.50	—	15.20	69	Dromin Jc.	43½	—	16.20	—	17.10
—	4.40	—	5.35	60½	Mile-post 52	52	—	24.35	—	26.15
43	41.00	27	26.00	58¼	Dundalk	54¼	28	27.30	31	30.10
—	36.55	—	21.40	54½	Mount Pleasant ..	58	—	7.25	—	7.40
—	32.50	—	17.20	50	Adavoyle	62½	—	15.50	—	16.35
—	29.20	—	13.35	47	Mile-post 65½ ..	65½	—	20.05	—	20.55
—	22.50	—	6.20	43¼	Bessbrook	69¼	—	23.50	—	24.50
—	19.20	22	20.55	40¾	Goraghwood	71¾	—	26.10	29	28.20
—	13.40	—	14.45	35½	Poyntzpass (*d*) ..	77	—	30.50	—	6.55
—	10.30	—	10.50	33	Scarva (*d*)	79½	—	33.50	11	10.30
—	8.00	—	8.20	30½	Tanderagee	82	—	36.15	—	4.35
31	35.25	22	21.10	25	Portadown	87½	43	43.10	11	11.45
—	30.00	—	15.50	20	Lurgan	92½	—	8.20	—	7.50
—	22.05*c*	—	12.15	16½	Mile-post 96	96	—	12.30	—	11.40
—	19.20*b*	—	9.35	14½	Moira	98	—	14.55*b*	—	13.55*b*
—	12.00	14	13.45	7½	Lisburn	105	—	23.25	Slip	21.05
—	5.10	—	6.05	2¼	Balmoral	110¼	—	28.40	—	26.15
—	0.00	0	0.00	0	Belfast	112½	32	32.15	32	29.35

Loads (tare weight in brackets).	Tons.	Tons.	Tons.
Dublin–Drogheda.	215 (204).	305 (285).	185 (176).
Drogheda–Dundalk.	215 (204).	275 (255).	185 (176).
Dundalk-Goraghwood.	215 (204).	230 (215).	185 (176).
Goraghwood–Portadown	215 (204).	255 (239).	185 (176).
Portadown–Lisburn.	185 (176).	255 (239).	185 (176).
Lisburn–Belfast.	185 (176).	220 (206).	185 (176).

Thick horizontal line indicates booked stop.

* Clifford 4-4-0, No. 130, Portadown to Belfast. *a*: p.w.r. check, Raheny. *b*: p.w.r. check, Moira. *c*: Signal stop, Kilmore. *d*: service slacks.

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minimum speeds. *Galtee More*, on the down "Limited," touched 62½ m.p.h. beyond Howth Junction and 66 at Malahide; up the ascent to mile-post 16 speed did not fall below 48½ m.p.h., with a subsequent maximum of 65 m.p.h. at Balbriggan. As will be seen, the 30¾ miles to Drogheda were run in 36¾ min., well inside time, despite the very slow stop which seems traditional on the Great Northern Railway. The latter probably arises out of the practice of drawing slowly up to water-columns, in view of the absence of troughs, and without it the times recorded would be even smarter than they are. *Slieve Donard*, on the much 52 m.p. "hump" as though it were not there, only falling to 56½ m.p.h. So a further ½-min. was gained to Dundalk. Relieved of the Oldcastle coach, *Slieve Donard* went so well from Drogheda up to mile-post 37¼, maintaining a steady 37½ m.p.h. on the 1 in 177, that the easiest running thereafter sufficed for time-keeping; so we only touched 65 m.p.h. on Dunleer bank, and fell to 37 at mile-post 52. For all that 50 sec. were gained between Drogheda and Dundalk on the easier 31-min. timing.

With a still further diminution of load by the loss, at Dundalk, of two coaches for Bundoran, *Slieve Donard* very nearly

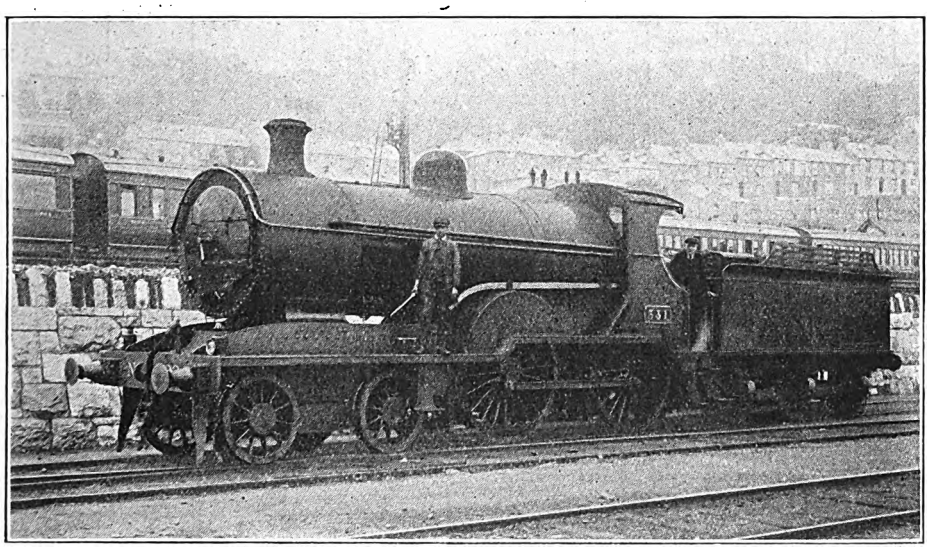

Photo.] GREAT SOUTHERN & WESTERN RAILWAY. [*A. Cronin.*

Rebuilt 4-4-0 locomotive, No. 331, at Cork,

heavier 9 a.m. down, was but little behind *Galtee More*, touching 62½ m.p.h. at Malahide and 64½ at Skerries and Balbriggan, with an intervening minimum of 45½ m.p.h. at mile-post 16. To cover the 22¼ miles from Howth Junction to Laytown in 23 min. 5 sec., as we did on this occasion, was an excellent piece of work with 305 tons, and thus we gained 50 sec. on schedule. Out of Drogheda *Galtee More* attained 43½ m.p.h. on the level 1¼ miles to mile-post 33, and then fell to 40 m.p.h. on the 1 in 167, recovering to 41 on the 177; after the summit we touched 67 m.p.h. on Dunleer bank (running very moderately), and then went over the tied with *Galtee More's* times up Adavoyle bank, and really did the better work of the two in proportion to the load hauled. Minimum speeds on the long stretch at 1 in 100 to mile-post 59½ were 27 and 29½ m.p.h.; at Adavoyle 33 and 34½ m.p.h., with accelerations to 46½ and 47½ m.p.h. on the easy ¾-mile beyond; while minima at the summit were 38 and 41 m.p.h. respectively. Very moderate speeds were run on the descent to Goraghwood, *Slieve Donard* touching 71½ m.p.h., and gaining a further 40 sec. to the stop, while *Galtee More*, passing, touched 69 m.p.h. before, and sustained 72½ afterwards. The remainder of the latter's journey to

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GREAT SOUTHERN & WESTERN RAILWAY: DUBLIN—CORK.

UP.				DIRECTION.			DOWN.			
2.45 p.m. 326 ‖ 302 †† 295		4.30 p.m. ‡ 332 ¶ 139 300		Train. Engine (large 4–4–0) Pilot (small 4–4–0) Load (tons)			7.35 a.m. 325 § 95 & ‖ 302 260		11.0 a.m. ‡ 331 — 300	
Schd.	Actual.	Sched.	Actual.	Distance.	Stations.	Distance.	Sched.	Actual.	Sched.	Actual.
min.	m. s.	min.	m. s.	miles.		miles.	min.	m. s.	min.	m. s.
63	29.20(*e*)	37	34.00	165½	Kingsbridge ..	0	0	0.00	0	0.00
—	24.10	—	28.45	161	Clondalkin	4½	—	10.05	—	11.55
—	18.50	—	23.05	155½	Hazlehatch	10	—	17.20	—	20.35
42	11.10	—	15.25	147½	Sallins	18	—	26.40	—	30.25
—	33.25(*f*)	—	7.50	140	Newbridge	25½	—	34.50	—	39.15
27	27.50	73	67.15	135½	Kildare	30	42	40.45	—	45.50*b*
—	20.10	—	59.00	128¾	Monasterevan ..	36¾	—	8.45	—	52.35
11	15.20	—	54.15	123¾	Portarlington ..	41¾	—	14.40	—	57.50
—	6.25(*d*)	—	48.40	117¾	Straboe Box ..	47¾	—	22.30	—	64.55
21	20.50	—	45.40	114½	Maryborough ..	51	28	27.40	—	68.50
—	16.40	—	41.55	111¼	Mile-post 54¼ ..	54¼	—	7.20	—	73.20
—	11.10	—	36.25	106	Mountrath	59½	—	13.25	—	79.00
51	51.15	—	28.45	98¾	Ballybrophy ..	66¾	25	24.25	—	88.40
—	44.00	—	21.50	93	Lisduff	72½	—	9.35	—	95.15
—	36.15	—	13.30	86¾	Templemore ..	78¾	—	16.50	—	101.40
26	26.30	28	27.40	79	Thurles	86½	25	26.15	110	110.25
—	16.55	—	17.15	70½	Goold's Cross ..	95	—	12.50*a*	—	13.15*a*
	12.15	—	12.30	66	Dundrum	99½	—	18.45	—	19.00
49	47.45	50	53.05	58½	†Limerick Jc.* ..	107¼	—	29.10	—	28.40
—	44.30	—	51.30	58¾	*Limerick Jc.† ..	107	28	30.55	27	30.40
—	41.40	—	48.30	56	Mile-post 109½ ..	109½	—	6.05	—	7.00
—	33.55	—	39.55	48½	Knocklong	117	—	15.20	—	16.45
—	26.00	—	30.50	41½	Kilmallock	124	—	22.40	—	24.20
22	21.10	—	25.30	36¼	Charleville	129¼	—	28.10	25	29.50
—	12.25	—	15.15	28½	Buttevant	137¼	—	37.15	—	12.15
—	9.20	—	11.50	25½	Mile-post 140 ..	140	—	40.35	—	15.45
34	34.35	35	38.20	21	Mallow	144½	46	46.10	22	21.10
—	27.00	—	30.30	14	Mile-post 151½ ..	151½	—	12.15	—	15.00
—	22.55	—	25.20	11	Rathduff	154½	—	15.45	—	18.50
	13.10	—	10.05*c*	4	Rathpeacon ..	161½	—	22.05	—	25.05
0	0.00	0	0.00	0	Cork	165½	29	26.30	33	29.50

Thick horizontal line indicates stop.

* Time of stopping beyond station (before setting back). † Time of arrival at platform. †† 325 tons from Maryborough to Dublin. ‡ Re-built with superheater. § From Dublin to Kildare. ‖ Between Limerick Junction and Cork. ¶ Small 0–6–0 goods engine, from Cork to Blarney only. *a*: p.w.r. check beyond Thurles Junction. *b*: Slight signal check, Curragh. *c*: Stop at Blarney to detach pilot, 13.15 to 16.00 ex-Cork (6 miles). *d*: Severe signal check, Straboe Box. *e*: Net arrival time, excluding stops at Inchicore and Island Bridge. *f*: Signal stop, 35 secs., and subsequent signal check at Ballast Pit Box.

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Portadown, apart from the Poyntzpass and Scarva slacks, from which good recoveries were made, was mostly at about the mile-a-minute rate, and time was kept but for a fractional loss of 10 sec. *Slieve Donard* had to call at Scarva in addition to Goraghwood, and made the 7¾-mile run between these two places very smartly in 10½ min., inclusive of Poyntzpass slack; but the subsequent 11-min. booking for the 8 miles on to Portadown is a "counsel of perfection," including, as it does, a bad slack over Portadown Junction, and ¾-min. was lost.

The last-mentioned loss was more than made up by a brilliant run from Portadown (in order, I assumed, to work the 10 a.m. *ex*-Belfast back to Dublin), and No. 130, a Clifford 4–4–0, came on instead. Certainly only ¼-min. was lost, and this was more than offset by the Moira check (net time being about 31¼ min.), but we had stayed 2 min. overtime at Portadown, and so arrived in Belfast 2 min. late; *Galtee More*, however, had gained a shade over 2 min. in all.

Slieve Donard again distinguished himself on the up "Limited Mail" journey, while the running of *Carrantuohill* was also of a first-class character. The former had an inauspicious start, as after the p.w.r. check at Moira, we were brought to

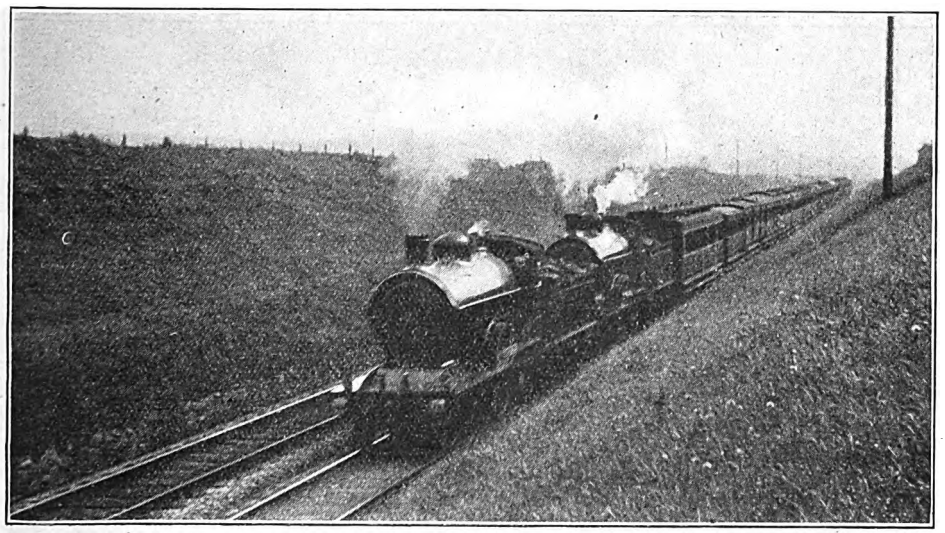

Photo.] GREAT SOUTHERN & WESTERN RAILWAY. [*R. L. Chapman.*

Down express near Inchicore. 4-4-0 locomotives, Nos. 305 and 307.

down into Belfast. A splendid ascent to mile-post 96, 8½ miles, was made in 11 min. 40 sec., with a minimum of 53 m.p.h., and despite a slight p.w.r. check at Moira, such good running ensued, with a maximum of 64½ m.p.h. at Dunmurry, that the 25 miles were completed in 29 min. 35 sec., or 28¾ min. net. *Slieve Donard* had, therefore, an aggregate of 5¼ min. to his credit at the end of this excellent journey. The final reduction of load was made at Lisburn, where a vestibuled coach destined for Portrush, *via* Antrim, was slipped. My "Limited Mail" run did not terminate quite so successfully, as *Galtee More* came off at a dead stand by adverse signals at Kilmore Box, before Lurgan. But we ran the 7⅞ miles from there to Portadown in the very brisk time of 9 min. 5 sec., with a top speed of 64½ m.p.h., and without the two checks should have covered the initial 25 miles in 31 min.. *Carrantuohill* also did well to cover the 17½ miles from Lisburn to Portadown in 21 min. 10 sec., with a maximum of 67 m.p.h. It may be mentioned that the 2.45 p.m. up express exactly reverses the working of the 9 a.m. down, the Portrush coach being attached at Lisburn, the Bundoran coaches at Dundalk, and the Oldcastle coach at Drogheda, while, in addition, a through coach from

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Belfast to Warrenpoint is carried as far as Goraghwood. These many changes account for the complex loading details which appear at the foot of the tables of running.

Inclusive, as usual, of the Scarva and Poyntzpass checks, 20 min. 55 sec., as achieved by *Carrantuohill*, was a smart time for the 15¾ miles from Portadown to Goraghwood, and involved another gain of over a minute, with 255 tons. *Slieve Donard* did even better, despite a lighter load, to pass the latter place in 19 min. 20 sec., maximum speeds in this case being 61½ m.p.h. at Tanderagee and also at mile-post 74. There was not a great difference between the loads over the summit, but *Slieve Donard* had the benefit of a flying start, and ran the complete 8½ miles of the ascent from mile-post 74 in 11 min. 50 sec. The rise between Goraghwood and the summit is one of 278 ft. (in 6¼ miles), averaging 1 in 119, and this was surmounted in exactly 10 min. at an average speed of 37.5 m.p.h. and a minimum of 32½. *Carrantuohill* attained 35 m.p.h. before Bessbrook and then fell back to 29 at the summit, climbing the 6¼ miles from the dead start on the grade in 13 min. 35 sec. Both engines went moderately down to Dundalk, not exceeding 72½ m.p.h. *Carrantuohill* gained a minute on this section, but *Slieve Donard's* gain of 2 min., which meant that the 33¼ miles run from Portadown had been achieved in 41 min., at an average speed—including two service slacks and a clear ascent of over 300 ft.—of all but 50 m.p.h., struck me as evidence of exceedingly fine work.

The comparatively easy allowance of 32 min. between Dundalk and Drogheda rendered it unnecessary for *Carrantuohill* to display any excess of energy, even with 275 tons, and we therefore accelerated to 32½ m.p.h. on the 1 in 160 out of Dundalk, and further to 57½ before Castlebellingham, falling to 35½ on Dunleer bank, and finally sprinting at 67 down to Dundalk, where the engine had to be credited with a further gain of a minute. *Slieve Donard's* corresponding figures were 39½, 60, 49 and 68 m.p.h. respectively, the minimum of 49 m.p.h. on 4¾ miles at 1 in 198 being another excellent feat. There was a slack over the Boyne viaduct at Drogheda in each case, as laid down, but as this immediately precedes the stop, the loss of time occasioned is trifling. On the final stage *Carrantuohill* touched 60 m.p.h. at Laytown, fell to 39½ on Skerries bank, and reached 64½ beyond Rush and Lusk. *Slieve Donard* ran considerably faster, although, of course, with only two-thirds of *Carrantuohill's* load, the speeds corre-

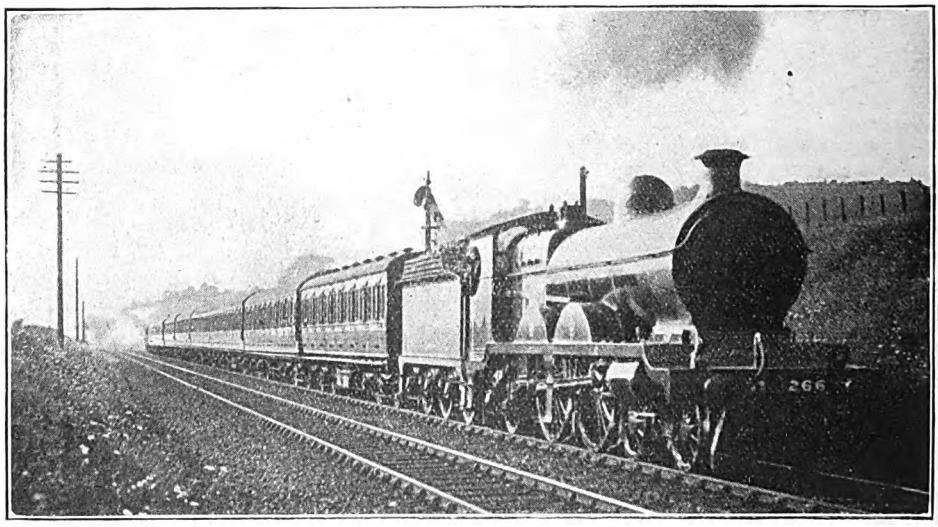

Photo.] GREAT CENTRAL RAILWAY. [*Capt. G. G. Templer, R.A.*

Up Nottingham and Leicester express. 4-4-2 locomotive, No. 266.

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sponding in this case being 62½, 49 and 69 m.p.h. respectively. So, despite the final p.w.r. slack, *Slieve Donard* gained 40 sec. on the 38-min. schedule (net time was about 36¼ min.), whereas *Carrantuohill* lost the trifling amount of 15 sec. *Slieve Donard's* gains on the fast time of the up "Limited" therefore, totalled 4¾ min. net, and *Carrantuohill* could be credited with 5¼ min. It is a remarkable fact that out of 20 start-to-stop runs made on these four smartly-scheduled journeys, 15 were made in less than booked time; 3 showed a loss of 10 to 15 sec., which was more than offset in two cases by delays; 1 showed an excess of ¾-min., which was far more than retimed the runs appearing in my article of last January may have obtained his maxima erroneously in this way, as I find now that they were distinctly higher than those usually run and also were out of proportion to the station-to-station times. Some of the latter also seem to have been in error.

And now for the Great Southern and Western Railway, on which I was equally fortunate in my experiences. There are only four leading expresses on the main line—the 7.35 a.m. *ex*-Kingsbridge (in reality running through from Kingstown Pier *via* Amiens Street and Island Bridge Junction) to Queenstown, returning from

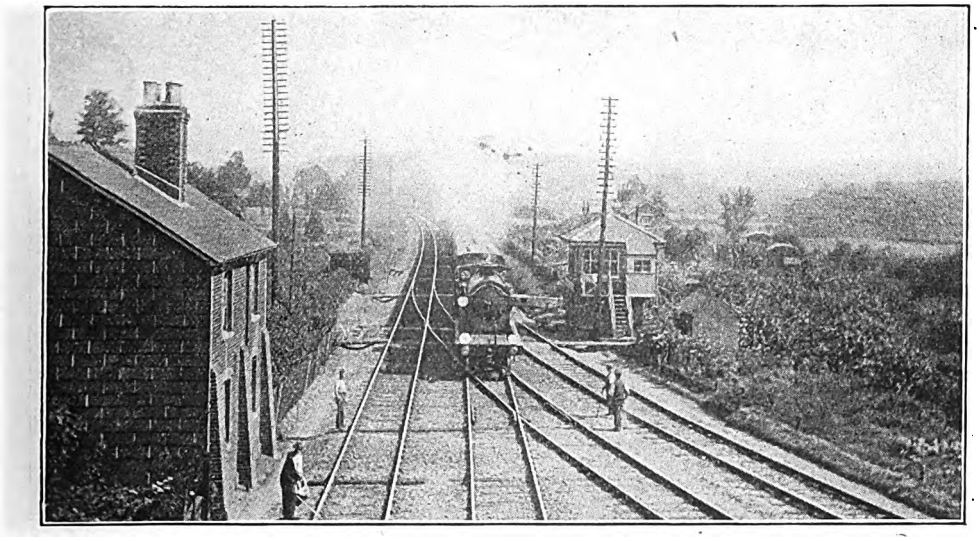

Photo.] LONDON & SOUTH WESTERN RAILWAY. [*G. H. Cannon.*

9.50 a.m. Waterloo–Portsmouth express passing Peasmarsh Junction, Guildford. 4-4-0 engine, No. 427.

gained on the next section; while the 4½ min. loss to Portadown of the up "Limited" included a check and a dead stand and was all regained before arrival at Dundalk. A notable record, this.

Rail-joint speed estimation on the Great Northern Railway of Ireland is sufficient to deceive the very elect, by the way. I noted considerable stretches of 33 ft. rails (40 to a ¼-mile), and also of a length which appeared to give 50 joints to a ¼-mile, being, therefore, about 27 ft. Then there were sections recently relaid with 45 ft. rails, and I very much fancy we negotiated some 30 ft. rails also. I imagine that the correspondent who

Queenstown at 2.15 p.m. and Cork at 2.45 p.m., and the new 11 a.m down luncheon car express, reaching Cork at 3 p.m. and returning at 4.30 p.m. The down mail is really expedited as compared with pre-war times, as the "slips" at Kildare and Thurles have been replaced by stops without increase of total journey time; the up mail runs in exactly the same point-to-point times as before the war throughout its journey, and is the only train now worked between Dublin and Cork in under 4 hours. The allowance is 3 hrs. 55 min. for 165½ miles of heavy grades, including four stops aggregating 17 min., while the necessity of stopping

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beyond Limerick Junction and setting back to the single platform (which occurs in both directions of running) is also worth at least 2 to 2½ min.

Just a word or two first as to the grading. The initial 30 miles to Kildare are almost entirely against the engine and the actual start is terribly severe, there being over ½-mile at 1 in 134 immediately outside Kingsbridge, with a full mile at 1 in 81 to Inchicore, and then ½-mile at 1 in 104, 1¼ at 1 in 138, and ½ at 1 in 169 to Clondalkin. After that the line undulates with a marked upward tendency to Newbridge, whence there are 2½ ascending miles at 1 in 172 concluding mile at 1 in 180), and rises to Lisduff at 1 in 177 and 340 in equal proportions; falls at 1 in 220–245 to mile-post 75½, and undulates from there right on to Limerick Junction, the most pronounced dip being from 91¼ miles to 95¼ miles (1 in 180 down to mile-post 93¼ and 1 in 230 up from 93½).

There is a smart ascent from Limerick Junction to mile-post 109½ (concluding with 1½ miles at 1 in 153), and a gradual ascent from there to mile-post 109, after which the line falls almost continuously to mile-post 126. The most pronounced lengths are 1 in 296–343, between 112 and

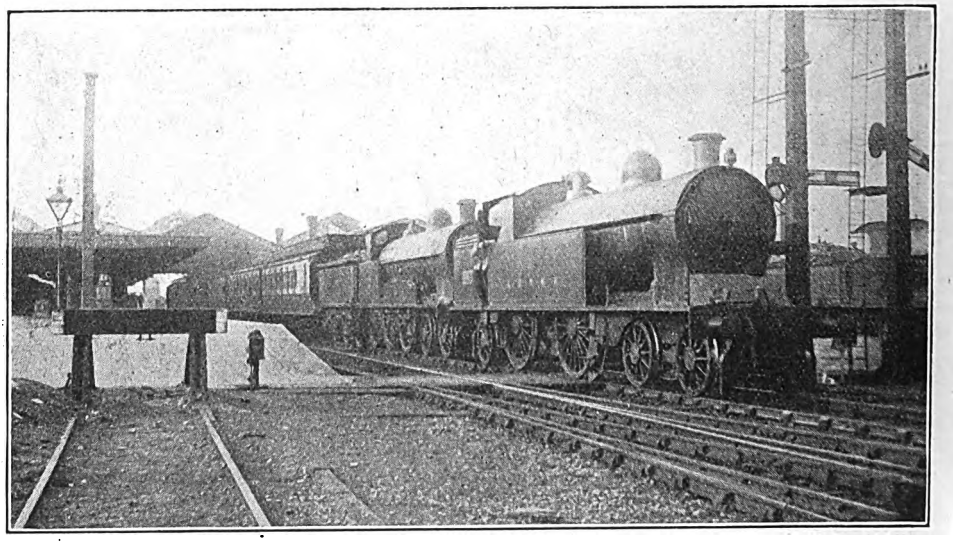

Photo.] LONDON & NORTH WESTERN RAILWAY. [*Chas. S. Lake.*

Up train at Bletchley. 4-4-2 tank engine and new superheater 4-6-0 (nameless).

NOTE.—The tank engine was detached immediately after the photograph was taken.

to the Curragh and a fall and rise at 1 in 234 and 212 to Kildare. From Kildare there are 3¾ falling miles at 1 in 180 past Cherryville Junction, with a switchback of fairly steep grades thence to the 43¼ mile-post, from which the line rises uninterruptedly again for 11 miles. The only steep part of this bank is from 48¼ to 49¾ miles (1 in 170) and 51 to 53¼ miles (1 in 230). After a fall at 1 in 280 from 54¼ to 56½ miles, sharp undulations again ensue to the 62¼ mile-post, whence there is a very steep rise at 1 in 128 to just beyond the 65th mile-post, with a fall at 1 in 200 to Ballybrophy. From the latter station the line falls to mile-post 69½ (with a 116½ miles, and roughly 1 in 300 between 121 and 126 miles. From 126 to 129¼ miles is an ascent at 1 in 393–490 and a further gradual ascent to 133¼ miles is followed by a sharp drop at 1 in 140 (1½ miles) and 1 in 230 (1 mile) to mile-post 136, near Buttevant. From mile-post 136¼ to mile-post 140 is a climb, concluding with a mile at 1 in 165, while from 140¼ to 144¼ miles (Mallow) is an unbroken 1 in 151 descent, renewed by ¼-mile at 127 just beyond the station. Then follows the arduous Mourne Abbey bank, extending at 1 in 130 from 145⅛ to 146⅝ miles, and at 1 in 140 from 146⅝ to the summit at the 151½ mile-post. The racing-ground

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thence to Cork commences at 1 in 286 for 2¼ miles and 1 in 177 for a further 2⅜, with a ¾-mile strip at 1 in 150 after an intervening ½-mile up at 1 in 350; then there is an undulating stretch between the 157½ and 162 mile-posts, the final 3½ miles from Rathpeacon into Cork being entirely at 1 in 60–70, and a fearsome start for up trains, save for ¼-mile level at Kilbarry sidings. There is, therefore, little or nothing to choose between the Great Southern and Western and Great Northern routes as regards the difficulty of the locomotive work; on the whole I should be inclined to consider the Great Southern and Western Railway as the harder route.

The only unpiloted stretch of my down journey on the morning mail was from Kildare to Limerick Junction, and here we caught a particularly violent north-westerly cross-wind, which hampered us on the exposed sections of the line. There is little to be said about the first stretch, to Kildare, save that the two engines mounted well to Clondalkin and had attained 55½ m.p.h. at Hazlehatch; the gain to Kildare was 1¼ min., despite a desperately slow stop in order to draw up to the water column. There was, of course, a substantial difference in the start of No. 331—one of Mr. E. A. Watson's recently rebuilt and superheated large 4–4–0 engines, at the head of an exceedingly handsome train of nine elliptical-roofed 60 ft. coaches, with restaurant car *en suite*—as, in addition to the heavier load and the absence of a pilot, I should judge it was necessary to start moderately in order to conserve the limited tender water supply for the long 86½ miles' run to Thurles. So we were 4½ min. behind the time of the first run at Newbridge and further suffered a signal check at the Curragh, costing a minute.

But from Kildare we went splendidly, and, as will be seen, substantially beat the work of No. 325 between stations on every section to Limerick Junction. At Monasterevan No. 331 did 65 m.p.h. against 325's 60, and the former engine ran the 17¾ miles from Kildare to Straboe in 19 min. 5 sec. On the 1 in 170 to Maryborough No. 331 maintained 43 m.p.h. and did not fall below 42 on the long succeeding stretch at 1 in 230 in mile-post 54¼. Then came a maximum of 60 m.p.h. at Mountrath, and a minimum of 29½ on the 1 in 128 before Ballybrophy. At Lisduff the minimum was 53 m.p.h., with a subsequent maximum of 64 before Templemore, which brought us into Thurles within 25 sec. of schedule time. Net time was 109½ min. from Dublin. No. 325 only attained 56½ m.p.h. at Mountrath, and fell to 27 on the 1 in 128, but slightly improved on time from Maryborough to Ballybrophy, as on the preceding stage. But there was a loss of 1¼ min. between Ballybrophy and Thurles, the minimum rate at Lisduff being 45 m.p.h. and the

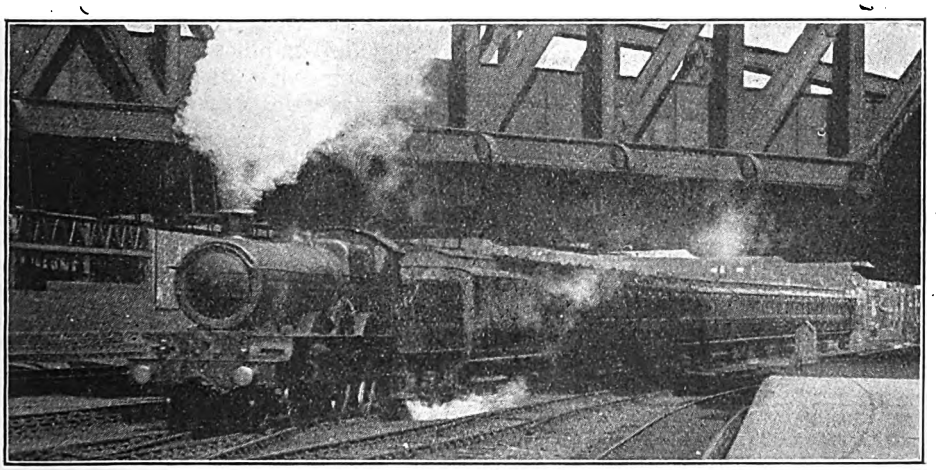

Photo.] GREAT WESTERN RAILWAY. [*A. Rigamonti.*

Newbury special express leaving Paddington. 4-cylinder 4-6-0 locomotive, No. 4015, "Knight of St. John."

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maximum at Templemore only 60. Both engines lost substantially between Thurles and Limerick Junction, but the times are a shade too tight in view of the setting back at the latter station, and in addition, a bad p.w.r. check was sustained in each case beyond Thurles Junction, costing No. 325 about 1¾ min. and No. 331 2¼ min. This leaves the net times from Thurles to the preliminary stop at Limerick Junction—20¾ miles—27½ min. and 26½ min., respectively. So the net loss on the two runs was only 1¼ and 1½ min., respectively, and the setting back to the platform, especially in the case of No. 325, was smartly done.

From this point No. 325 was again piloted and with maxima of 58½ m.p.h. at Knocklong, 66 before Charleville and 62.5 at Buttevant, coupled with minima of 50½ m.p.h. on the short ascent after Knocklong, 44½ on Charleville bank and 42½ on the ascent to mile-post 140, no difficulty was experienced in keeping time to Mallow, despite the fact that the final descent to Mallow was made entirely without steam and at no higher speed than 62½ m.p.h. In fact, one might have expected brisker downhill running over all this easy section, as the train was running several minutes behind time throughout from Dublin. Some amends were made on the final length into Cork, however, as Mourne Abbey bank was ascended at a steady 38 m.p.h. and a speed of 74 m.p.h. was then attained before Blarney. The concluding drop into Cork was taken most cautiously, but even so we gained 2½ min. from Mallow, running the 21 miles in 26½ min. exactly. Unpiloted, No. 325 covered the remaining 11¾ miles to Queenstown, mostly level, in 17 min. 20 sec. Allowing for Thurles Junction p.w.r. slack, the engines had about 2 min. to their credit between Dublin and Cork.

The 11 a.m. down has the fastest booking on the Great Southern and Western Railway, between Limerick Junction and Charleville—22 miles in 25 min.—but it is, I fear, somewhat of a "paper" timing, being impracticable with a 300-tons train, and in view, probably, of the ample subsequent margin of time on the Mallow-Cork section, we ran easily to Charleville and lost nearly 5 min. by so doing, touching 57½ m.p.h. at Knocklong and 66 before Charleville Junction, with an intervening minimum of 50. But from Charleville to Mallow we gained 50 sec., passing Buttevant at 61 m.p.h., only falling to 42½ on

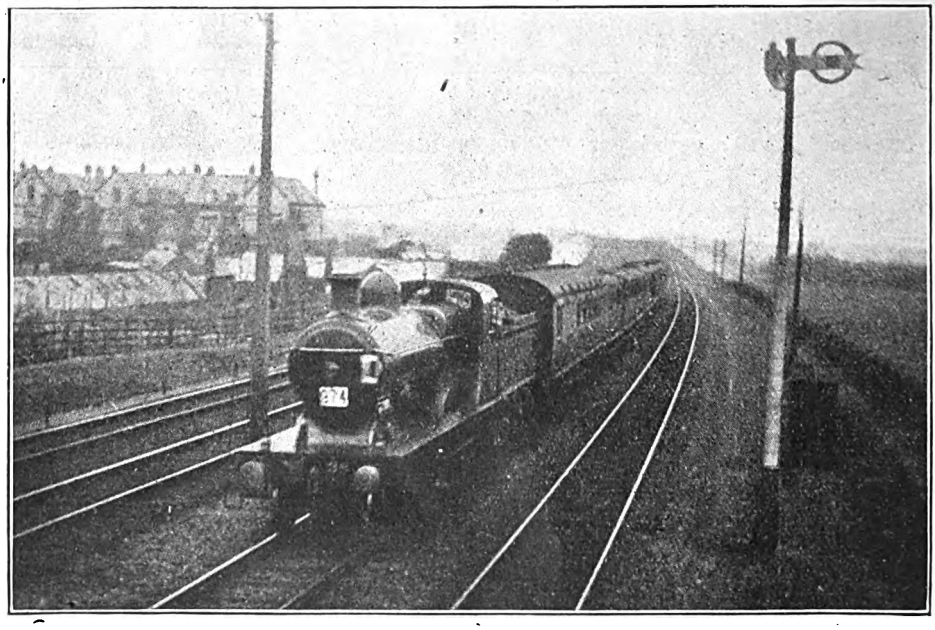

Photo.] NORTH STAFFORDSHIRE RAILWAY. [*R. F. Legget.*

Stoke–Rhyl through train near Rhyl, L. & N.W.R. 4-4-0 superheater engine, No. 38.

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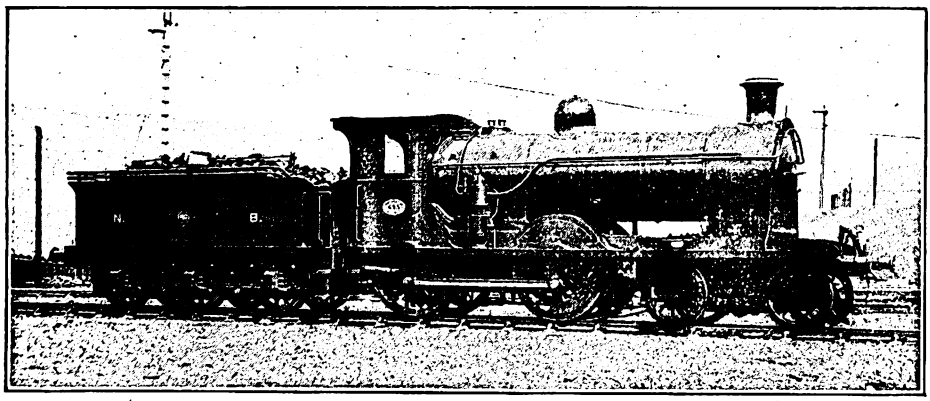
the ascent to mile-post 140 and reaching 68 m.p.h. before Mallow. Fine work was also done on the concluding section, as with 300 tons we sustained 31½ m.p.h. steadily on the long 1 in 140 of Mourne Abbey bank and then touched 72½ m.p.h. before Cork, gaining over 3 min. on schedule despite another very careful descent into Cork. On this journey about 2 min. must go against the engine, but 300 tons is a very heavy load for an unpiloted 4–4–0 over 165½ miles of so hard a road as this, and, further, owing to economy of time at stations, we were running well on time and reached Cork a minute early.

All the finest running, however, was made on the up journeys. The two trains had exactly corresponding engines on their return journeys (unfortunately No. 400, the large 4-cylinder 4–6–0, was apparently off for repairs, as I saw her decorated with ladders and other appliances outside the sheds at Inchicore), the 2.45 p.m. from Cork being worked by No. 325—another large non-superheater 4–4–0 with taper boiler—and the 4.30 p.m. by rebuilt superheater 4–4–0 No. 332. But the piloting arrangements were different, as No. 325 had the services of No. 302 working back from Cork to Limerick Junction, but no pilot thereafter, whereas No. 332 was piloted only up the steeper part of the rise from Cork to Blarney by No. 139, a small 0–6–0 goods engine. My journey on the 2.45 p.m., by the way, commenced at Queenstown. No. 325, unpiloted, completing the 11¾ miles run into Cork (with a sharply-rising start) in 17 min. 55 sec.—schedule is 18 min.—with a train of 11 bogies weighing 269 tons empty and 285 tons full. A large influx of passengers and luggage at Cork increased this weight to 295 tons, the train being now crowded. No. 332 had exactly the same load as No. 331 on the down journey, the nine vehicles (which, excepting the brake, are very heavy, weighing from 31 to 33½ tons apiece) totalling 286 tons empty and 300 tons loaded.

The engines of the up mail slipped somewhat in the tunnel at the start and so did not get above 18½ m.p.h. on the 1 in 60; but on the undulations beyond Blarney we touched 49½ and only falling to 42½ m.p.h. on the final ascent to mile-post 151½, and attaining 74 past Mourne Abbey, we gained 1½ min. to Mallow. Nos. 332 and 139 went much better up to Rathpeacon, reaching 23½ m.p.h. on the 1 in 60 ascent, and drew up at Blarney, 6 miles from the start, in 13¼ min. exactly. Detaching the pilot occupied 2¾ min., and No. 332, unaided, then passed the summit, 8 miles from Blarney, in 14½ min., at 31½ m.p.h., touched 71½ past Mourne Abbey, and reached Mallow 3 min. 20 sec. behind time, which loss little more than equalled the time actually standing at Blarney. From Mallow to Limerick the piloted train (which by now was so packed that the gross weight could not have been far short of



NORTH BRITISH RAILWAY.

Mixed traffic engine, No. 695. Originally designed by Mr. H. Holmes; rebuilt by Mr. W. P. Reid with Robinson superheater, standard boiler and new cab.

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300 tons) naturally had all the advantage, and the time of 44½ min. to the stop beyond Limerick Junction—a full 37¾ miles—represented an average of 50.9 m.p.h. Had we set back more smartly to the platform, as in the next run, our total time would have been only 46 min.—a gain of 3 min. On the 1 in 151 from the start to mile-post 151½ we accelerated to 39 m.p.h. and then touched 64 m.p.h. at Buttevant, 66 beyond Charleville and 67 before Limerick Junction. No. 332's corresponding figures on this length were 32½, 57, 60 and 60 m.p.h., respectively, with minima of 41 m.p.h. on Knocklong bank and 43 at mile-post 109½, so that we lost 3 min., despite setting back so very briskly at the junction.

Thenceforward both trains were unpiloted and ran well. No. 332 slightly improved on time to Thurles, touching 64½ m.p.h. on the Goold's Cross "dip" and falling to 49 on the other side of it. No. 331 had reached 60 at Dundrum and touched 66 beyond Goold's Cross, with a subsequent minimum of 50½, while the minimum beyond Thurles was 44 m.p.h. and at Lisduff 47. In this case time was almost exactly maintained to Ballybrophy, where another very slow stop was made to draw up to the water column. Ballybrophy to Maryborough was run in a shade under schedule, with a maximum of 65 m.p.h. at Caddagh Box and a minimum of 53 at mile-post 54¼. After Maryborough, where our load was further increased to 12 bogies or 325 tons full, we were most unfortunate. The Waterford train was evidently just in front of us and every good piece of running brought us up against adverse signals. These occurred first at Straboe box, where we were brought down to 20 m.p.h.; then we got up to 64 m.p.h. at Portarlington and mounted the long 1 in 180 to Kildare at a minimum of 44—a fine piece of work this—only to be brought to a dead stand at Newbridge from the same cause, for 35 sec. This 25½ miles' length had been run in 33 min. 35 sec., or 31½ min. net. Again we got away well, despite a slight delay at Caragh box, touching 65 m.p.h. at Sallins, 67 at Straffan, falling only to 61 at Lucan and then again reaching 67 at, and 71½ after Clondalkin; but we were brought to a further stop at Inchicore, having covered the 24 miles from Newbridge quite brilliantly, start-to-stop, in 27¼ min., or 26½ min. net. Without the final delays we should have reached Kingsbridge, with little doubt, in our allotted 63 min. from Maryborough despite the Straboe slack and the Newbridge stop, and as these delays, on a careful computation, could not at the very least have cost less than 6 min., the net time from Maryborough, 51 miles, was, with 325 tons, not more than 57 min.—an average of 53.7 m.p.h.,

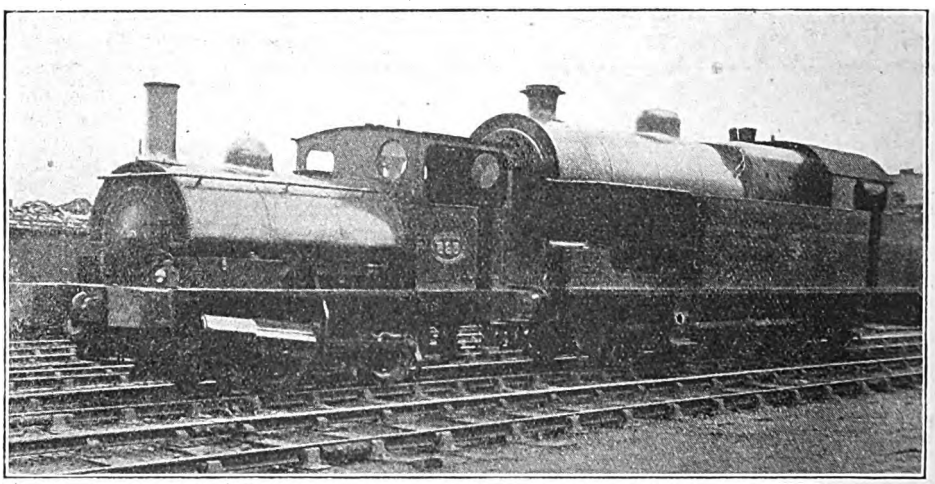

Photo. [*W. H. Whitworth.*

LANCASHIRE AND YORKSHIRE RAILWAY.

0–4–0 and 0–8–2 Shunting Tank Engines at Agecroft, near Pendleton.

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and a gain of 6 min. on schedule. The engines on this journey had, therefore, gained 7¾ min., or, if credit be given for the slow setting back at Limerick Junction (where we were well before time), not less than 9½ min.

But the cream of all the journeys was found in No. 332's running from Thurles into Dublin. First of all our speed fell to 44 m.p.h., both at Lisduff and beyond Ballybrophy, but then began a regular speed orgie. We rose to 69 m.p.h. at Mountrath, 64 at Maryborough and 67 at both Portarlington and Monasterevan, with a minimum of 50 m.p.h. at mile-post 54¼. So the 30 miles from Ballybrophy to Monasterevan were run in 30¼ min. and the complete 56½ miles from Thurles to Kildare in 67¼ min., at an average of 50.7 m.p.h. and 5¾ min. under schedule. From Kildare again we ran very smartly, touching 64½ m.p.h. at Sallins, 66 at Straffan and 68 before Inchicore, after which the rest of the descent into Kingsbridge was taken very carefully. Even then we had run in from Kildare in 34 min. at an average of 52.9 m.p.h., this further gain of 3 min., added to the previous 5¾ min., making a total to engine of 8¾ min. from Thurles alone. This far more than offset the previous loss of 6 min., and of the latter only 3 min. could be reckoned against the engine, as the loss from Cork to Mallow was largely due to the long stop at Blarney for detaching the pilot.

I am conscious of having described these runs at considerable length, but the character of the performance merits it—the bulk of the running, indeed, seems superior to the general average in Great Britain to-day, although, so far as Ireland is concerned, the number of trains run at these speeds is certainly very few—and, further, I feel that it is but an act of tardy justice to devote a complete article to the excellent locomotive work achieved in Ireland, now that circumstances have at last made it possible for me personally to make its acquaintance.

A Veteran of 1864.

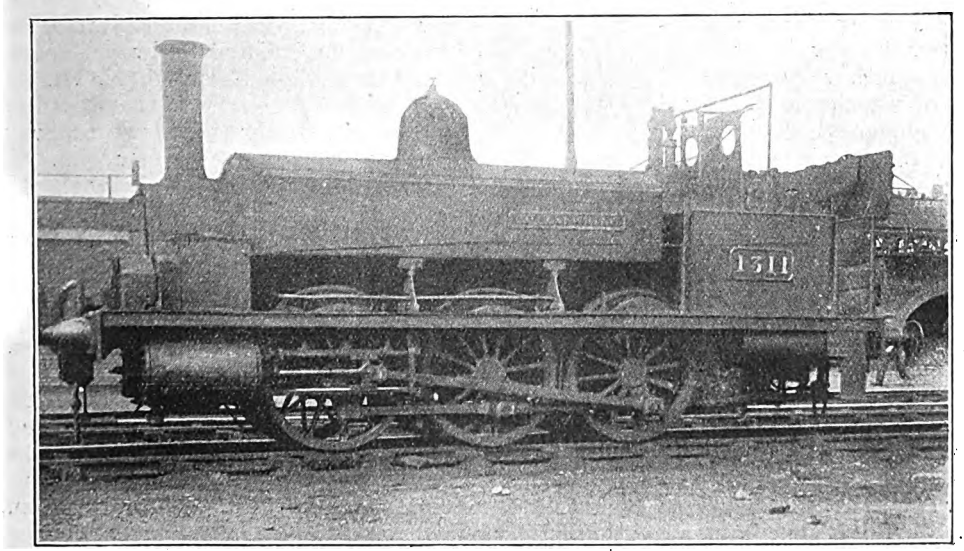

Photo.] [*H. L. Hopwood.*

0-6-0 TANK ENGINE NO. 1311 "CHEESEWRING," GREAT WESTERN RAILWAY.

Formerly a Liskeard & Looe Railway Locomotive.

This engine was built by Hopkins, Gillees & Co., in 1864, for the Liskeard & Looe Railway (see RAILWAY MAGAZINE, November, 1917). It was reboilered in 1890, and by comparing this photograph with that of the companion engine "Kilmar" illustrated in that article the differences will be noted. During the war "Cheesewring" was employed on shunting work in a munitions yard adjacent to the Great Western Railway in the London district. The photograph was taken on the occasion of the recent visit of the Railway Club to Old Oak Common Locomotive Sheds, Great Western Railway.

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The Ministry of Transport Act, 1919.

The Ministry Established; Sir Eric Geddes appointed First Minister; Powers Conferred and Anticipated Plan of Operations.

THE Ministry of Transport Act received Royal Assent on August 13, after occupying the attention of the two Houses of Parliament for a period of about five and a half months, and a great task now lies before Sir Eric Geddes, no longer Minister-Designate of Ways and Communications, but duly appointed the first Minister of Transport. The Ways and Communications Bill has received many criticisms and has been amended in several important respects; but it has emerged in a form which still embodies wide powers and offers great scope for the future. It rests with the new chief and his staff to produce substantial results from the exercise of the considerable powers given to the new Ministry.

His Majesty the King has duly approved the appointment of Sir Eric Geddes as First Minister of Transport under the terms of the new Act.

Last month we gave a list of prospective heads of branches in the new Ministry, and for completeness this may be repeated :—

Civil Engineering.—Sir Alexander Gibb, K.B.E.

Consultant Mechanical Engineer.—Sir John A. F. Aspinall, President of the Institution of Civil Engineers, formerly General Manager and now Director, Lancashire and Yorkshire Railway.

Mechanical Engineering.—Lieut.-Colonel L. Simpson, D.S.O., R.E., late Traction Superintendent, Buenos Ayres and Pacific Railway.

Traffic.—Sir Philip Nash, K.C.M.G., Assistant General Manager, East Indian Railway and late Director-General of Transportation in France. Originally trained on the Great Northern Railway.

Statistics and Accounts.—Sir J. George Beharrell, D.S.O., late Assistant Goods Manager, North Eastern Railway.

Secretarial and Legal.—Sir Francis Dunnell, Secretary and Solicitor, North Eastern Railway.

Development.—Rear-Admiral Sir Charles Martin de Bartolome, K.C.M.G.

Public Safety and Labour.—Sir William Marwood, K.C.B., Joint Permanent Secretary, Board of Trade.

Director of Irish Transport.—Mr. H. G. Burgess, Irish Traffic Manager, London and North Western Railway.

Roads Department.—Brigadier-General Sir Henry P. Maybury, K.C.M.G., Director of Roads under the Director-General of Transportation, France, Manager and Secretary of the Road Board.

The headquarters of the Ministry of Transport are located, temporarily, at 6, Whitehall Gardens. Some departments are placed in Forecourt Bungalow, Montague House and elsewhere. The new Ministry is taking over, with their staffs, the Railway Department of the Board of Trade and part of the Public Utilities and Harbour Department, in the former being included railways, docks, tramways, canals and light railways, all branches of the existing Railway Department. Sir William Marwood, K.C.B., at present Second Secretary to the Board of Trade, and previously head of the Railway Department, goes over to the new Ministry, and will be concerned mainly with the responsible work of inspection from the point of view of public safety. Mr. R. H. Hill, of the Board of Trade, is acting as private secretary to Sir Eric Geddes.

An interesting portrait of the Right Hon. Sir Eric Geddes, G.C.B., G.B.E., M.P., is reproduced. Educated at Edinburgh Academy, Oxford Military College and Merchiston Castle School, Edinburgh, he was originally intended for the Army, but after passing his preliminary examination, went to the United States. There he joined the service of the Baltimore and Ohio Railroad, obtaining wide experience in operating work in stations and in marshalling yards. In 1895 he left America for India, becoming manager of the Powayan Steam Tramway. When this line was taken over by the Lucknow-Bareilly State Railway he was appointed Assistant Traffic Manager to the Rohilkund

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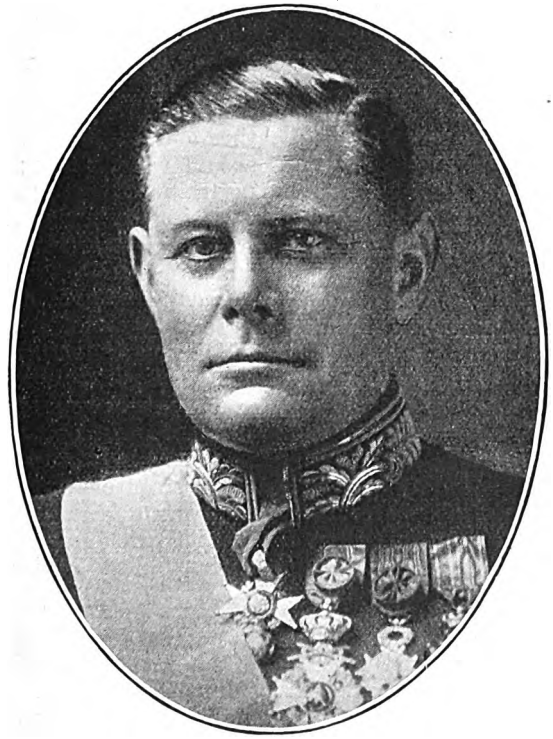
and Kumaon Railway, and a year later became Traffic Manager.

In October, 1904, he returned to England, joining the North Eastern Railway as Claims Agent. In 1905 he was appointed Commercial Agent, and in 1906 became Deputy Chief Goods Manager, six months later succeeding to the position of Chief Goods Manager. In 1911 he was appointed Deputy General Manager, which position he held when his services were loaned to the Ministry of Munitions during the war. In 1916 he was appointed Director-General of Military Railways with the rank of major-general, and received the honour of the Order of the Bath. His services were then lent to the Admiralty as Controller, with the honorary and temporary rank of vice-admiral, and in July, 1917, he was appointed First Lord of the Admiralty. On July 31, 1917, he took his seat in the House of Commons as member for the Borough of Cambridge.

While engaged on the North Eastern Railway he was selected to undertake several special commissions. He held the

THE FIRST MINISTER OF TRANSPORT.



J. Russell] [*& Sons.*

THE RT. HON. SIR ERIC GEDDES, G.C.B., G.B.E., M.P.

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rank of lieut.-colonel in the Engineer and Railway Staff Corps. During the war his services as Director-General of Military Railways proved especially valuable, but he also rendered notable services at the Ministry of Munitions, the Admiralty, and for a period in regard to demobilisation. In the New Year's Honours for this year the distinction of G.C.B. was conferred upon him by His Majesty, in addition to those of K.C.B. and G.B.E., already held. During the greater part of this year Sir Eric Geddes has been engaged on the Ministry of Ways and Communications Bill, for the progress of which he has been mainly responsible.

The Act creating the Ministry of Transport will probably have more far-reaching effects upon the transportation of the country than any measure previously introduced into Parliament. No apology is therefore needed for reviewing at some length the wide powers conferred upon the Minister which *inter alia* may affect the wages of every transport worker, the charges on railway travel, and the rates on goods of every description.

Taking over Existing Powers—Some Powers not Transferred.

The first object of the Act is to co-ordinate and bring under the new Minister the whole of the powers of existing Government Departments in relation to railways, light railways, tramways, canals, waterways and inland navigations, roads, bridges and ferries and vehicles and traffic thereon, harbours, docks and piers. Certain of the powers, which may be more properly exercised by the Department in which they are now vested, can be excepted from this transfer when the Order in Council in fixing the date of the transfer is made, and it is understood that amongst the exceptions will be the powers of conciliation of the Board of Trade under section 30 of the Railway and Canal Traffic Act, 1888. The Board of Trade retains its functions as the guardian of trade and commerce, and in that capacity it is no doubt right that it should voice the grievances of the traders, in relation to railway rates and charges, facilities, &c., bringing pressure to bear on the new Ministry where this is justified. Another important function of the Board of Trade which is not transferred to the new Ministry is the appointment of members, and the approval of the procedure of the Railway and Canal Commission. The Minister of Transport could not be considered a disinterested Minister; nor, on the other hand, could the President of the Board of Trade be so regarded, bearing in mind the special functions to which reference has already been made. In order to secure impartial nomination to this tribunal, the powers hitherto exercised by the Board of Trade will be transferred to a Secretary of State.

Two Years allowed for formulating a Transportation Policy.

In addition to co-ordinating all the powers of existing Government Departments, the Act puts upon the Minister responsibility for initiating and formulating a transportation policy. Two years are allowed for this; but obviously transportation cannot stagnate whilst a policy is being considered. To prevent this stagnation special temporary powers are conferred on the Minister in Clause 3.

The clause gives the Minister the right, in the first place, to retain possession of all railway undertakings of which possession has already been taken by the Government under the Regulation of the Forces Act, 1871. In the second place it gives the Minister the right to take possession of any other statutory railway, light railway or tramway undertaking, or of any canal or protective clause referred to later, of any harbour, dock or pier undertaking.

Temporary Powers of the Minister of Transport.

When possession is taken of an undertaking the Minister has full power of control and direction. He may, subject to reference to an Advisory Committee, give directions as to the rates and fares to be charged. All salaries and wages of employees are also subject to his control. He may order the working or the discontinuance of part of an undertaking or the closing of any station which in his opinion is not necessary for the public service. He may take steps to see that alterations and improvements are carried out which would result in greater efficiency or more economical working. He has full authority to confer running powers on one company over the lines of another.

These powers are extraordinarily wide and only the extreme necessity of the

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situation could have induced Parliament to confer powers of such magnitude. A most valuable protection has, however, been afforded to shareholders under this section, which prevents the minister compelling any undertaking to incur capital expenditure or to draw upon reserve funds to an extent which would seriously interfere with their finances.

During the two years it should be possible for railways to make considerable progress, as under the temporary powers conferred upon him the Minister can authorise the railway companies to carry out alterations and improvements and to acquire land without the tedious delay and expense which ordinary Private Bill procedure involves.

Increases in Rates—May be Continued for Eighteen Months after Expiration of Period of Control.

The Rates Advisory Committee, which is set up under Clause 21 of the Act should be of great assistance to the Minister, as it is composed of representatives of the law, of transportation, of trade, of agriculture and of labour, but Ministerial responsibility is not in any way interfered with. The Committee is an advisory one and the Minister may act on its advice or not as he chooses. Throughout the Act it will be observed that Parliament has maintained inviolate the principle of direct Ministerial responsibility. To complete the Minister's powers with regard to rates and charges, special provision has been made in Clause 3 that rates, fares, tolls, dues, and other charges directed by the Minister shall be deemed to be reasonable and may be charged, notwithstanding any agreement or statutory provisions limiting the amount of such charges. This is a most valuable clause as it will enable the Minister to bring increased rates into operation in excess of those prescribed in the Orders Confirmation Acts, and will obviate the necessity of justifying each individual rate in accordance with the provisions of the Railway and Canal Traffic Act, 1894. Both Houses of Parliament were convinced that these exceptionally wide powers were necessary, having regard to the extremely limited space of time allowed to the Minister for this work. It would obviously be unfair to hand the railways back to their owners at the end of the period of two years with largely increased working expenses, but under the old conditions as to maximum powers. Provision has, therefore, been made that the rates charged by the Minister may be continued for a further period of 18 months after the expiration of the period of control. This will afford a breathing space during which, if the railways are handed back, application can be made to Parliament for revised maximum charges. The rights of traders in regard to undue preference, allowances and rebates, are preserved; but all demands to preserve the right of complaint on the ground of reasonable facilities were defeated, as they would be repugnant to the powers to close stations or discontinue the working of a line now conferred upon the Minister.

The Position of Dock and Harbour Undertakings.

The clause giving protection to harbour, dock and pier undertakings prevents the Minister from taking possession of those undertakings without their consent; but it still leaves him full power to order the improvement and extension of transport facilities and accommodation, or the alteration of methods of working of those undertakings. This is a most valuable power and should result in much closer co-operation between the docks and the railways serving them. The Minister cannot, however, interfere with the charges at those docks unless they are taken possession of by consent. As is well known, most of the large dock undertakings have had increased charging powers granted to them under the Defence of the Realm Act. Certain dock undertakings have obtained increased powers during the past session; but it will be interesting to see what attitude those undertakings will adopt whose increased powers of charge will lapse with the Defence of the Realm Act. It is not unlikely that those undertakings which protested most strongly against the Bill will have to ask, for their own protection, to be taken over by the Minister.

Through Working on Tramways.

Clause 5 is of peculiar interest to localities served by more than one tramway system. Under this clause the Minister has power to order through running on adjoining tramways and to settle the terms. In this way, unnecessary

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change of cars now existing in certain districts can be obviated.

Compensation for Individuals and Undertakings.

Ample provision has been made for compensating officers and servants of existing undertakings who may be transferred to the Ministry, and also those officers and servants who remain with their undertakings; but whose services may become redundant owing to the acts of the Minister.

The compensation to be paid to undertakings is fully dealt with in Clause 8. This clause provides for compensation in the event of loss of revenue during the period of control and compensation for reduction in value on a revenue-earning basis in the event of the undertakings being handed back to their owners. Similarly, if an undertaking has been enhanced by the action of the Minister, compensation is due to the Government. Special provision has, however, been made which secures that the owners of the undertaking receive without payment for enhancement the benefit of capital expenditure on works brought into use in the interval, and also the benefit of any natural growth of traffic which may have occurred. This clause is an extremely valuable one, as failing such a clause, several arbitration proceedings might have been necessary to determine the compensation payable to the companies. Under agreement with the Board of Trade the Railway and Canal Commission were appointed arbitrators; but there were many items of claim outside that agreement, and for those recourse might have had to be made to the Arbitrator under the Regulation of the Forces Act, 1871. This would have involved proceedings under the Lands Clauses Act. It is most satisfactory to all parties that one tribunal can dispose of all claims.

The Establishment of New Transport Services.

Clause 9 gives the Minister very wide powers. The powers to establish transport services by land or water are only of a temporary character; but the powers to work services which may be so established, are permanent. The Minister cannot establish any service of this kind without first giving the owners of the undertaking, which it appears to the Minister could properly establish such a service, the opportunity of doing so. This provision is consistent with the principle underlying the Act, namely, that competition for traffic has served its day. It is a complete safeguard to all undertakings against Ministerial competition. The Minister must obtain the approval of Parliament, by special resolution of both Houses, for any service involving an expenditure of over half a million pounds, the acquisition of land compulsorily, or the breaking up of roads; but when this resolution has been obtained all Private Bill procedure becomes unnecessary.

Acquisition of Privately-Owned Railway Wagons.

One of the most important clauses of the Bill is the one dealing with the acquisition of privately-owned wagons. These wagons have for years presented a most difficult problem to all engaged in railway operation. The additional cost entailed in working traffic in such wagons is well known, and the completion of the arrangements for the carrying out of these powers will, no doubt, be one of the first subjects to which the Minister will give his attention. Under the clause the Minister can make a selection; but in order to avoid any suggestion of preferential treatment, if he acquires any one wagon used for the conveyance of a particular traffic, he must acquire the whole of such wagons in England and Wales, Scotland or Ireland, as the case may be. The abolition of private wagons has naturally involved an extension to mineral class traffic of the obligation of the railway companies to afford reasonable facilities, and it is the duty of the Minister to exercise his powers of disposing of wagons so as to enable the railway companies to fulfil this obligation.

Minister's Power to Make Advances for New Works and Improvements.

In addition to powers to establish services, the Minister has powers, which will be extremely valuable, to make advances for the construction, improvement, or maintenance of the various classes of undertakings and also for the promotion of transport services by existing companies. Under this clause the Minister can assist any company to construct a light railway or to carry out large schemes of improvement such as widening, the provision of marshalling yards and the like.

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The powers of this clause appear to have been drawn so wide as to enable the Minister to assist any existing undertaking in any direction which he sees fit. Under this clause the Minister may, after consultation with the Roads Advisory Committee and the local authorities affected, classify roads and defray a moiety of the salary and establishment charges of the engineer and surveyor. This should ensure better and more economical maintenance of roads and any contributions to the cost of main arterial roads will be reflected in the amount of local rates paid by railway companies in that area.

MINISTER'S POWER TO CALL FOR ACCOUNTS, STATISTICS AND RETURNS.

Clause 18, giving the Minister power to call for accounts, statistics and returns, is one which will be regarded with considerable interest in many quarters. Under the powers conferred on the Board of Trade by the Railway Companies (Accounts and Returns) Act, 1911, any change in form could be objected to by or on behalf of the railway companies, and if the objectors represented 33⅓ per cent. of the aggregate capital of the railway companies of the United Kingdom, a special Act of Parliament was necessary before the forms could be altered. Under the present Act the Minister has power to call for any statistics he may require, not only from railway companies, but from canal companies, dock companies and road authorities. It is extremely probable that during the course of the two years much more detailed information as to the operation of these various undertakings will have to be compiled to enable the Minister to formulate a definite transport policy.

THE ADVISORY COMMITTEES.

In addition to the Rates Advisory Committee, to which reference has already been made, an Advisory Committee has been appointed in connection with roads, which will consist of representatives of highway authorities, of all users of horse and mechanical traffic and of labour.

A panel of experts will also be set up, appointed from the nominees of the various undertakings and associations of interests concerned, and from this panel the Minister may appoint a committee to advise him on various matters from time to time. It is expressly provided that a committee of this panel must be consulted before the Minister exercises his powers to take over undertakings of which the Government have not now possession, or before he establishes new services by land or water. This committee, however, in no way takes away from the Minister's responsibility and freedom of action.

COMPETITION—THE NEW PHASE.

It is apparent to all that the Act marks a definite step forward in connection with all transport undertakings. Competition for traffic ceases. It is a luxury which must in the end unduly increase the cost of service. On the other hand, the Ministerial powers enable all operations to be closely scrutinised, and there can be no doubt that competition in securing good results, both in efficiency of service and reduction in cost will be stimulated with ultimate benefit to the comfort of the travelling public and the development of our trade and commerce.

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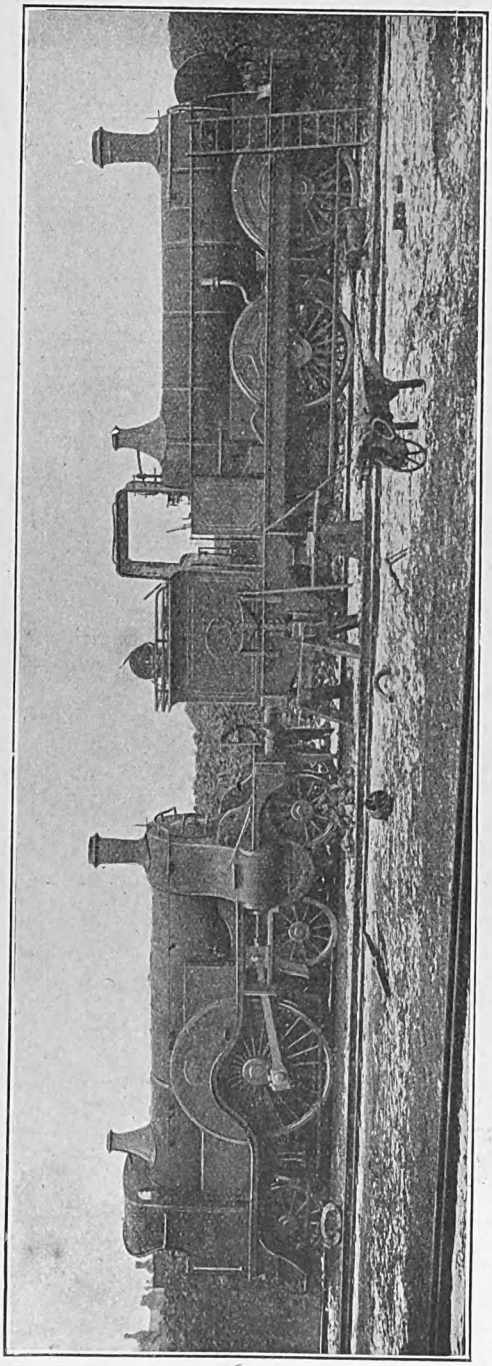
The Last of the Stirling 8-ft. Singles: Great Northern Railway.



STIRLING 8-ft. SINGLE EXPRESS LOCOMOTIVE AND 0-4-2 BUNKER TANK ENGINE IN THE BREAKING-UP YARD AT DONCASTER.

We are indebted to Mr. H. N. Gresley, Locomotive Engineer, Great Northern Railway, for the accompanying illustration showing locomotives, designed by the late Mr. Patrick Stirling and built at Doncaster Works respectively in the years 1869 (tank engine) and 1895 (express engine), in course of being broken up. Both engines have seen considerable service, and have been rendered more or less obsolete by the increasing weight of traffic and loads to be hauled on the Great Northern Railway.

The tank engine is of the 0-4-2 type, with inside cylinders, the latter measuring 17½-in. diam by 24-in. stroke. Coupled wheels had a diameter of 5 ft. 8 in. on the tread, and trailing wheels of 4 ft. 2 in. diam. The engine had a total wheelbase of 20 ft. 3 in. It weighed 44 tons 4 cwt. in working order. Total heating surface was 849·33 sq. ft., and grate area 14·06 sq. ft. Working pressure was 160 lb. per sq. in. This engine, which was one of a numerous series, was classified F. 4.

The express engine will be recognised at a glance as one of the Stirling 8-ft. singles, the driving wheels when new measuring 8 ft. 2 in. on tread. This particular locomotive was one of the later additions to the class, bearing the number 1006, so it had cylinders 19½ in. by 28 in.; heating surface, total 1,031·7 sq. ft.; and grate area 20 sq. ft. A working pressure of 160 lb. was carried. In working order this engine weighed 49½ tons, with 18 tons available for adhesion. The tender weighed almost as much as the engine when full, namely, 41 tons 15 cwt., with 5 tons of coal and 3,850 gallons of water. Both engines were fitted with a Stirling class of boiler minus a steam dome, the regulator valve being located in the smoke-box.

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Summer Train Services in 1919.

By "VOYÂGEUR."

IN the February, 1919, issue of the RAILWAY MAGAZINE, an article appeared under the caption "War and the Railways—British Express Train Services in 1918," reviewing the lowest ebb to which the express services of this country had fallen during the course of last year as a result of war conditions. At the conclusion of the first summer following the termination of the war, it is of interest to detail the improvements which have been effected, while at the same time comparing the present services again with those which obtained in pre-war days. The tables now given therefore incorporate comparisons between the best times of 1914, 1918 and 1919.

There were in existence in 1918 people foolish enough to imagine that the conclusion of the Armistice would result in an immediate restoration of all pre-war facilities of travel. Such ingenuous individuals had not the remotest conception of the straits to which war necessity had reduced the railway companies. The practical cessation of rolling-stock construction, the loss of *matériel* sent overseas, and the extensive curtailment even of necessary repairs during the war period—let alone the shortage of staff—combined to handicap the railways in a degree even yet but imperfectly understood by the public at large. Obviously a return to pre-war efficiency, and with it to anything like pre-war facilities, must be a slow process, and in view of the fact that the general relaxation from the pressure of war activities was bound to occasion an enormous holiday traffic in all directions, the most that was to be hoped for in the summer of 1919 was *not* an all-round acceleration of running, but a multiplication of trains and a restoration of the amenities of travel, such as restaurant cars and corridor coaches. This expectation has been fully borne out. An increase in the number of trains running of course involves a certain measure of acceleration, as it enables intermediate stops to be cut out, and it is to this cause that the limited amount of speeding-up displayed in the tables is mainly due.

Table A indicates the fastest times between London and the principal provincial cities, towns and holiday resorts. From this it will be seen that, in the majority of instances, the acceleration of 1919 over 1918 "crack" times has been but small, and even trifling. What the table does not show, nor could without the reproduction of masses of figures, is the increase in the number of expresses, and the reduction of *average* journey times in a great many cases to something much more closely approaching the best times. The most substantial general acceleration of actual running times is found on the East Coast route. Actually the 9.45 a.m. relief "Scotsman" *ex*-King's Cross is booked into Edinburgh at 6.38 p.m., or 7 min. less than the standard and nominally fastest time of 9 hours. Elsewhere the Great Eastern and South Eastern and Chatham Railways show some good figures, owing to the reinstitution of real express services on both lines. On the other hand, it is the re-timing of the "Cornish Riviera" express on the Great Western Railway that gives rise to so considerable an acceleration of the times to Exeter and Penzance; similarly the accelerated West Coast times to Perth and Inverness are achieved by one train only (the 7.10 p.m. *ex*-Euston), and the substantial improvement in the Manchester times of the Midland Railway is confined to four trains, two in each direction. The return of one direct Great Northern express each way daily between King's Cross and Harrogate is also responsible for a substantial curtailment of the Harrogate time by this route. It may be added that in these and all the following remarks the present tense is used, as this article is actually being written in the month of August, but it is, of course, possible that further improvements in October may render some of the figures out of date.

Table B deals with the daily non-stop runs in August, 1919, exceeding 100 miles in length. Although these have been doubled as compared with the worst war period, a return to anything like pre-war

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TABLE A.—FASTEST TIMES BETWEEN LONDON AND PROVINCIAL TOWNS 1914, 1918 AND 1919.

Town.	Distance.	Aug., 1919. Fastest Time.	Direction.	Railway.	July 1914. Fastest Time.	Oct., 1918. Fastest Time.	Increase 1914–1918.	Decrease 1918–1919.
	miles.	h. m.			h. m.	h. m.	h. m.	h. m.
Aberdeen	523½	12 45	Down	East Coast Rlys. ..	13 30	11 05	2.25	0.45
Birmingham ..	110½	2 30	Both	G.W.R.	2 30	2 00	0.30	Nil
,, ..	113	2 30	,,	L. & N.W.R.	2 35	2 00	0.35	0.05
Bournemouth ..	108	2 31	Down	L. & S.W.R.	2 39	2 00	0.39	0.08
Bradford	193¼	4 45	Up ..	G.N.R.	4 50	3 56	0 54	0 05
,, ...	208	4 54	Down	G.C. & L. & Y. Rlys. ..	5 00	4 42	0 18	0 06
,, ...	203½	5 35	Up ..	Midland R.	5 55	4 13	1 42	0 20
Brighton	51	1 05	Down	L.B. & S.C.R.	1 15	1 00	0 15	0 10
Bristol	117½	2 15	Up ..	G.W.R.	2 15	2 00	0 15	Nil
Cardiff	145¼	3 02	Down	,, ...	3 10	2 50	0 20	0 08
Carlisle	299	6 45	Both	L. & N.W.R.	6 45	5 48	0 57	Nil
,, ...	308¾	7 28	Down	Midland R.	7 28	6 05	1 25	,,
Edinburgh ..	393	8 53	,,	East Coast Rlys. ..	9 40	7 45	1 55	0 47
Exeter	173¼	3 15	Both	G.W.R.	3 30	3 00	0 30	0 15
,, ...	171¾	3 51	Down	L. & S.W.R.	3 57	3 14	0 43	0 06
Glasgow	401½	9 30	Both	West Coast Rlys. ..	9 30	8 00	1 30	Nil
,, ...	424½	10 40	Down	M. & G. & S.W. Rlys...	10 40	8 45	1 55	,,
Harrogate.. ..	198¾	4 40	Up ..	G.N. & N.E. Rlys. ..	5 20	4 00	1 20	0 40
,, ...	214½	6 00	,, ..	Mid. & N.E. Rlys. ..	6 05	4 30	1 35	0 05
Hull	196¾	4 50	Down	G.N. & N.E. Rlys. ..	4 55	3 52	1 03	0 05
Inverness	567¾	14 50	,,	West Coast Rlys. ..	15 55	12 50	3 05	1 05
Leeds	185¾	4 20	Up ..	G.N.R.	4 32	3 25	1 07	0 12
,, ...	196	4 47	Down	Midland R.	4 47	3 40	1 07	Nil
Leicester	99	2 03	Up ..	,, ...	2 15	1 45	0 30	0 12
,, ...	103	1 56	Down	G.C.R.	1 56	1 49	0 07	Nil
Liverpool	192¼	4 30	Both	L. & N.W.R.	4 45	3 35	1 10	0 15
Manchester ..	188¾	4 30	,,	,, ...	4 35	3 30	1 05	0 05
,, ..	189½	4 30	,,	Midland R.	5 08	3 40	1 28	0 38
,, ..	212	4 45	,,	G.C.R.	4 45	4 10	0 35	Nil
Margate	74	1 30	,,	S.E. & C.R.	2 03	1 30	0 33	0 33
Newcastle ..	268½	5 55	Down	G.N. & N.E. Rlys. ..	5 55	5 13	0 42	Nil
Norwich	115	2 34	,,	G.E.R.	2 54	2 26	0 28	0 20
Nottingham ..	123½	2 45	,,	Midland R.	2 55	2 12	0 43	0 10
,, ..	126½	2 27	,,	G.C.R.	2 27	2 23	0 04	Nil
Penzance	305¼	6 45	,,	G.W.R.	7 55	6 30	1 25	1 10
Perth	449¾	10 26	,,	West Coast Rlys. ..	11 05	9 00	2 05	0 39
Plymouth (N. Rd.)	225¾	4 22	,,	G.W.R.	5 00	4 07	0 53	0 38
,,	230¾	6 00	,,	L. & S.W.R.	5 55	4 55	1 00	*0 05
Sheffield	164¾	3 22	,,	G.C.R.	3 22	2 57	0 25	Nil
,, ...	158¼	4 00	Up ..	Midland R.	4 01	3 00	1 01	0 01
Whitehaven ..	311	8 25	Down	L.N.W. & Furness Rlys.	9 05	7 45	1 20	0 40
Yarmouth.. ..	121¾	2 58	,,	G.E.R.	3 58	2 30	1 28	1 00
York	188	4 00	,,	G.N.R.	4 00	3 35	0 25	Nil

* 5 min *deceleration*..

figures is most unlikely, owing to the institution of the 8-hours day, and the necessity, from the economy point of view, of reducing the length of runs, so that enginemen and trainmen may be returned to their home stations at the earliest possible moment. On one railway at least—the London and North Western—this is responsible for introducing stops for working purposes in a number of runs advertised as non-stop in the public time-tables. Thus, as mentioned last month in "British Locomotive Practice and Performance," the 11.5 and 11.15 a.m., 2.25, 5.20, 7.10 and 11.30 p.m. expresses *ex*-Euston, all nominally non-stop to Crewe, and the 4.8 a.m. from Crewe to Euston, call at Rugby daily; the 9.25 p.m. and 9.35 p.m. down (in the public time-tables non-stop from Euston to Carlisle and Tamworth to Carnforth respectively) both call at Crewe; the 8.10 p.m. Euston to Holyhead stops at Chester; the 10.43 p.m. Crewe to Carlisle and the

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12.45 a.m. Carlisle to Crewe call at Preston and the 12.30 a.m. Carlisle to Crewe at Carnforth; while the 2 p.m. from Liverpool to London stops at Crewe on its nominally non-stop stage from Mossley Hill to Rugby. These halts, which are all duly scheduled in the working time-tables, cut the 100-mile non-stop journeys on the London and North Western Railway from an apparent figure of 30 to an actual one of 16.

On the Great Western Railway the 2.25 a.m. from Shrewsbury to Bristol is excluded, as it calls at Hereford. No mention is made of the 10.35 a.m. from Paddington to Taunton, as this is only scheduled to run on Mondays, Fridays and Saturdays. The Great Northern figures include the 9.45 a.m., 6.45 and 10.38 p.m. expresses from King's Cross to Grantham, and the 4.27 a.m. and 5.3 p.m. up, as these relief expresses have been scheduled to run daily during the summer. Several of the same trains appear in the North Eastern collection, *e.g.*, the 1.0 and 4.56 a.m. expresses from Newcastle to Edinburgh (leaving King's Cross at 6.45 and 10.38 p.m. respectively), and the relief down day "Scotsman," leaving Newcastle at 3.52 p.m., and reaching Edinburgh without intermediate stoppage at 6.38 p.m., in 8 hours 53 min. from London. Similarly the 10 a.m. from Edinburgh (in this case the *first* portion) misses Berwick, and there is a relief to the 10 p.m. up (leaving at

TABLE B.—NON-STOP RUNS IN AUGUST, 1919, EXCEEDING 100 MILES.

Railway.	Runs between	Distance.	No. of Runs.	Fastest Time.	Speed.	Fastest Train.	Total No. of Runs.		
							1919	1918	1914
		Miles.		Min.	m.p.h.				
L. & N.W.R.	Euston–Chester ..	179¼	1	219	49.1	8.10 p.m., D	—	—	—
,,	Euston–Crewe	158	3	194	48.9	8.20 p.m., D	—	—	—
,,	Crewe–Willesden ..	152½	1	184	49.7	2. 6 a.m., U	—	—	—
,,	Crewe–Carlisle ..	141	4	187	45.2	1.13 a.m., D	—	—	—
,,	Euston–Stafford ..	133½	1	170	47.1	4.45 p.m., D	16	10	62
,,	Carlisle–Warrington ..	116¾	1	158	44.3	11.45 p.m., U	—	—	—
,,	Euston–Tamworth ..	110	1	146	45.2	9.35 p.m., D	—	—	—
,,	Crewe–Holyhead ..	105¾	2	133	47.7	1.7 a.m., D	—	—	—
,,	Wigan–Carlisle ..	105¼	2	142	44.5	11.57 p.m., D¶	—	—	—
G.W.R. ..	Paddington–Plymouth	225¾	1	262	51.7	10.30 a.m., D	—	—	—
,, ..	Paddington–Exeter ..	173¾	2	195	53.8	11.30 a.m., D††	—	—	—
,, ..	Paddington–Taunton	143	3	158	54.3	3.30 p.m., D	—	—	—
,, ..	Newport–Paddington	133½	1§	165	48.6	10.25 a.m., U	—	—	—
,, ..	Severn Tunnel Junct.–Paddington	123½	2*	148	50.1	3.52 p.m., U	15	6	37
,, ..	Bristol–Paddington ..	117½	1‡	135	52.2	12.10 p.m., U	—	—	—
,, ..	Paddington–Bath ..	107	3	118	54.4	11.15 a.m., D	—	—	—
,, ..	Reading–Taunton ..	107	2	122	52.6	4.15 p.m., U.	—	—	—
G.N.R. ..	King's Cross–Grantham	105½	13	131	48.3	7.19 p.m., U	13	6	29
N.E.R. ..	Newcastle–Edinburgh	124½	9	145‖	51.5	11.20 a.m., D	9	3	13
G.C.R. ..	Marylebone–Leicester	103	2	116	53.2	3.15 p.m., D	2	2	4
Caledonian R.	Glasgow–Carlisle ..	102½	1	155†	39.7	9.45 p.m., U	1	Nil	8
Midland R.	—	—	—	—	—	—	Nil	Nil	23
G.E.R. ..	—	—	—	—	—	—	Nil	Nil	7
L. & S.W.R.	—	—	—	—	—	—	Nil	Nil	4
Total ..							56	27	187

* Include conditional stops at Badminton, which still leave 100 miles' non-stop journey to Paddington.

† 8.2 p.m. down in 148 min., but latter schedule includes 2 min. stop at Beattock for water.

‡ Two runs on Sundays.

¶ Also 12.15 a.m. down in same time. †† Also 1.45 p.m. up in same time.

§ Includes conditional stop at Severn Tunnel Junction, which still leaves 123¼ miles' non-stop run to London. ‖ Accelerated time from September 1.

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TABLE C.—LONGEST NON-STOP RUNS IN AUGUST, 1919, ON RAILWAYS HAVING NO RUNS EXCEEDING 100 MILES.

Railway.	Runs between	Distance.	No. of Runs.	Fastest Time.	Speed	Fastest Train.	Longest run in July, 1914
		Miles.		Min.	m.p.h.		Miles.
Midland R. ..	London–Leicester ..	99	6	132	45.0	2.10 p.m.,D†	206
L. & S.W.R. ..	Salisbury–Exeter ..	88	2	120	44.0	12.25 p.m., D*	108
G.S. & W.R.(1)	Dublin–Thurles ..	86½	1	110	47.2	11.0 a.m., D	86¾
L.B. & S.C.R.	Victoria–Fratton ..	85	1	112	45.5	11.35 a.m., D	85
N.B.R. ..	Arbroath–Edinburgh ..	76¼	1	117	39.1	8.4 p.m., U	98¼
S.E. & C.R. ..	Victoria–Margate ..	74	3	90	49.3	3.15 p.m., D	77½
G.E.R.	Liverpool Street–Ipswich.	68¾	8	88	46.9	4.55 p.m., D	130
G. & S.W.R. ..	Dumfries–Kilmarnock	58¼	7	78	44.8	6.7 a.m., D‡	58¼
M.G.W.R. (1)..	Dublin–Mullingar ..	50	8	70	42.9	4.55 p.m., U	50
L. & Y. R. ..	Manchester–Poulton ..	45¼	1	62	43.8	4.55 p.m., D	48
Cambrian R. ..	Machynlleth–Welshpool.	41¾	2	73	33.9	10.52 a.m., U	34
Highland R. ..	Kingussie–Blair Atholl	36¼	6	62	35.1	5.3 p.m., U	68¾
G.N.R. (1) ..	Dundalk–Portadown	33¼	2	43	46.4	8.35 a.m., D¶	33¼

* Also 12.41 p.m.
† Also 4.15 p.m. down ; 11.37 a.m. up makes run in 123 min., but calls at Wellingborough.
‡ Also 7.47 p.m. down and 11.30 a.m. and 5.15 p.m. up.
¶ Also 5.1 p.m. up.

9.40 p.m.) also included. A non-stop horse and carriage train from Edinburgh to Newcastle at 11.2 p.m. is not counted, as this runs only when required. The Caledonian is a difficult line to set out, but in point of fact only the one train shown is entitled to inclusion in this list, and even this has a conditional, though not a regular, stop at Carstairs for locomotive purposes. Definite daily stops are scheduled for the 6.55 a.m. and 8.2 p.m. expresses from Carlisle to Glasgow, and the 2.5 and 2.30 a.m. from Carlisle to Stirling at Beattock for water and banking assistance, and in the event of their being piloted from Carlisle, the stop is made at Beattock Summit instead, and the pilot detached there. It is only in the rare event of the pilot being taken right through that a non-stop run takes place. In addition, the 2.30 a.m. from Carlisle to the North stops regularly at Motherwell in order to detach mail vans for Glasgow.

Our old friend " Bradshaw " tries hard to make us believe—in fact, says so categorically—that the 6.35 p.m. East Coast express from Aberdeen to London does not stop at Edinburgh, which would mean a non-stop run from Arbroath to Berwick. But it does, of course, make the stop, the train being handed over by the North British authorities to the North Eastern Railway at this point as usual (though not for passenger purposes), and it is not therefore found in the table. The conditional stops at Kettering of the 8.50 and 9.5 p.m. down Scotch expresses from St. Pancras are invariably made, and these are not included, the Midland Railway, in common with the Great Eastern and London and South Western lines, having temporarily ceased to be represented among the " 100-milers."

The total of 100-mile runs, therefore, while a little more than twice that in force at the conclusion of the war, is still less than one-third of the number operating in 1914. It is only fair to add, however, that the latter figures, when last published, included trains running on Sundays, and also on certain days of the week only, trains making conditional stops which were in reality regular, and the journeys of slip coaches. The runs enumerated in the accompanying table are strictly confined to runs made daily during the summer, and trains having conditional stops in the non-stop stages are only included when those stops really are conditional and infrequently made.

Table C is an additional one, and of subsidiary importance, showing the longest

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runs performed on railways which have no non-stop runs exceeding 100 miles in length. This again is confined to trains running regularly throughout the week. The Midland London-Leicester runs are practically 100-mile ones, only missing the mark by a single mile. Curiously enough the fastest journey in this case is not by a non-stop express, but by the 11.37 a.m. up—one of the recently accelerated Manchester trains—which calls at Wellingborough, and yet beats the fastest non-stop time by 9 min. Until July, Waterloo-Salisbury had for a considerable period been the longest London and South Western Railway run, but the reinstitution of non-stop Salisbury-Exeter trips raised the figure from 83¾ to 88 miles. The North British run is that referred to in the last paragraph, made by the 6.35 p.m. from Aberdeen to London; and this is the only passenger train in the time-table that misses Dundee. There are longer non-stop journeys in the Lancashire and Yorkshire time-table than the one shown—as, for example, from Halifax to Waterloo Road (Blackpool), 64 miles—but these are special holiday trains, running once a week, whereas the train given in the table runs daily.

We now come to the fastest runs performed on leading railways, which, if not exactly representative of running as a whole, certainly form an interesting collection. Most of the faster runs are short "snippets" over favourably-graded lengths of line, in particular those of the Great Central, Great Eastern, Great Southern and Western, Caledonian, Great Northern, London and South Western and Great North of Scotland Railways. The Great Western, North Eastern, South Eastern and Chatham and North British runs are made over practically level routes, save for the initial Cowlairs ascent in the last-mentioned case.

Pride of place goes to the Great Central Railway, and the 36-minute run of the 6.10 p.m. down Bradford express between Woodford and Leicester is only 0·1 m.p.h. behind the run shown in point of speed. On the North Eastern Railway the 9.38 p.m. from York to Newcastle (5.30 p.m. *ex*-King's Cross) ceased to call

TABLE D.—FASTEST RUNS ON LEADING RAILWAYS IN 1914 AND 1919.

In August, 1919.							¶In 1914.
Railway.	Train.	From	To	Miles.	Minutes	Speed m.p.h.	Speed m.p.h.
G.C.R. ..	4.13 a.m. ..	Rugby	Leicester ..	99/100	21	56.8	61.3
G.W.R. ..	2.30 a.m.*	Paddington ..	Swindon ..	77¼	83	56.6	59.2
N.E.R. ..	9.45 p.m.†	York	Northallerton	30	34	52.9	61.7
G.E.R. ..	12.50 p.m.	Shenfield ..	Rochford ..	18½	21	52.9	52.9
S.E. & C.R.	12.10 p.m.	Faversham ..	Margate ..	22	25	52.8	54.8
G.S. & W.R. (I.).	1.30 p.m. ..	Limerick Jc. ..	Charleville ..	22	25	52.8	51.9
Caledonian R.	5.49 p.m. ..	Beattock ..	Lockerbie ..	14	16	52.5	57.2
L. & N.W.R.	8.23 a.m. ..	Willesden ..	Rugby ..	77¼	91	50.9	57.7
G.N.R. ..	5.53 p.m. ..	Hitchin	Huntingdon ..	27	32	50.6	57.5
G.N.R. (I.) ..	7.25 a.m. ‖	Dublin	Drogheda ..	31¾	38	50.1	48.0
Midland R. ..	12.22 p.m.	Wellingborough	St. Pancras ..	65	78	50.0	56.8
L. & S.W.R.	9.21 a.m.§ ..	Dorchester ..	Wareham ..	15	18	50.0	57.2
G. & S.W.R.	5.10 p.m.‡	St. Enoch ..	Ayr	41⅝	50	49.7	54.6
L. & Y.R. ..	19 trains††	Liverpool ..	Manchester ..	36½	45	48.7	54.7
N.B.R. ..	3.55 p.m. ..	Glasgow ..	Haymarket ..	46½	58	47.9	52.3
L.B. & S.C.R.	9.44 p.m.S..	E. Croydon ..	Brighton ..	40¼	51	47.4	51.0
G.N.S.R. ..	8.45 a.m. ..	Ballater ..	Aboyne ..	11	14	47.1	47.1
C.L.C. ..	19 trains††	Manchester ..	Warrington ..	15⅝	21	44.6	51.7
N.S.R. ..	12.49 p.m.	Macclesfield ..	Stoke ..	19⅞	27	44.2	50.0
M.G.W.R. (I.)	4.55 p.m. ..	Mullingar ..	Dublin ..	50	70	42.9	42.0
Highland R.	6.25 p.m. ..	Blair Atholl ..	Perth ..	35¼	50	42.3	42.3

* Newspaper express; does not convey passengers. † Also 9.11 a.m. Up. ‡ Also 8.25 a.m. Up. ‖ Also 6.17 p.m. Up. †† In both directions. S. Sundays only. ¶ Not necessarily between the same stations. § Also by 10.58 a.m. and 6.5 p.m.

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at Northallerton on and from August 14, and its 32-min timing from York to Northallerton is therefore omitted; in any case it was never more than a "paper" timing, being impossible of achievement with the huge loads hauled nightly. From the same date the 7.53 a.m. from Newcastle to York omitted stopping at Thirsk, so that the 25 min. run from Darlington to Thirsk (22¼ miles, average 53.4 m.p.h.) also disappeared from the time-tables. I am afraid the Great Southern and Western Railway (Ireland) run is made rather on paper than in practice, the train concerned having an ample subsequent margin of time for regaining anything lost on this length. In view of the very steep intermediate grades, the Lancashire and Yorkshire Liverpool-Manchester service is really worthy of a higher place in the table; loads of eight and more bogies are not worked between the two cities by any means easily even in the decelerated time of 45 min. One of the most creditable runs in the whole table is that shown against the North Staffordshire Railway; the train concerned is the midday London and North Western express from Manchester to London, generally made up to 60 axles and weighing fully 450 tons, and is always worked to Stoke by a North Staffordshire 0-6-4 or 4-4-2 type tank engine. The Highland run also is commendable, as the bulk of the route is single line, and there are heavy switchback grades throughout. The general average speed of all these 21 runs works out at less than 5 m.p.h. below the figure for 1914—to be exact, 4.7 m.p.h.—and this reduction is probably roughly representative of the average deceleration of running times all round.

Lastly, I have prepared an additional table (E) showing the regular daily restaurant car services operating in August, 1919, as compared with those of the pre-war and war periods respectively. The services, as will be seen, are divided

TABLE E.—RESTAURANT AND PULLMAN CAR TRAINS IN 1914, 1918 AND 1919.

Railway.	Restaurant Cars.			Tea cars.	Pullman cars.	Totals.		
	Worked.	Jointly Worked.	Worked by Foreign Cos.			Aug., 1919.	Oct., 1918.	July 1914.
L. & N.W.R. ..	16	12	—	11	—	39	—	80
Caledonian R. ..	12	12	—	—	12	36	—	23
L.B. & S.C.R. ..	—	—	—	—	36	36	20	44
Midland R. ..	28	4	—	—	—	32	20	64
L. & S.W.R. ..	24	—	—	—	—	24	12	36
G.W.R.	18	—	2	4	—	24	—	88
G.E.R...	23	—	—	—	—	23	4	35
G.N.R.	10	8	—	—	—	18	—	34
N.B.R.	10	6	—	—	—	16	—	40
L. & Y.R.	6	—	10	—	—	16	2	22
N.E.R.	2	8	4	—	—	14	—	42
S.E. & C.R... ..	—	—	—	—	12	12	—	17
G.C.R.	10	—	—	—	—	10	8	22
G.N.R. (1)	4	—	—	4	—	8	8	4
G. & S.W.R. ..	2	4	—	—	—	6	2	10
Metropclitan R. ..	—	—	—	—	6	6	—	10
G.S. & W.R. (1) ..	4	—	—	—	—	4	—	6
D. & S.E.R. (1) ..	2	—	2	—	—	4	—	4
M.G.W.R. (1) ..	2	—	—	—	—	2	—	3
Cambrian R. ..	—	—	—	2	—	2	—	—
N.C.C. (1) ..	—	—	—	—	—	—	—	2
* Net totals ...	178	24	—	21	66	284	72	474

* These totals do not include the same cars more than once when they run over more than one ystem.

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up into those worked directly by the companies concerned, those worked jointly by two or more companies, those worked over one company's lines by the cars of another, *e.g.*, "worked by foreign companies," and also tea-cars (*i.e.*, small kitchens in a compartment of an ordinary coach as opposed to restaurant cars of the ordinary type) and Pullman cars. Pullman restaurant cars admitting passengers of both classes without any fee supplementary to the cost of the meals, as on the Caledonian Railway, are treated as ordinary restaurant cars. To total all these figures up without allowance for the fact that the same cars appear on more than one railway, in cases of joint or foreign working, would give an erroneously high figure, and due adjustment has therefore been made in arriving at the net totals. It will be seen that the number of restaurant and Pullman car services operating during the last stages of the war has now been quadrupled, although even yet little more than one-half the pre-war figure has been reached. But in view of the reduced number of expresses now running, as compared with pre-war days, the present proportion of cars to trains is considerably higher than might be imagined by a mere comparison of the current and the pre-war totals.

The jointly worked services on the London and North Western and Caledonian lines are, of course, the West Coast joint cars: the Midland and Glasgow and South Western London-Glasgow cars are jointly operated; and on the East Coast route three trains daily in each direction have East Coast joint cars, the remaining two services on the Great Northern and North Eastern Railways, joint between these two companies only, being the 5.30 p.m. from King's Cross to Newcastle, and the return train at 7.50 a.m. Catering on the latter, in point of fact, is undertaken by the North Eastern Company, although I have included the cars as joint. As regards the "Worked by Foreign Companies" column, the two trains on the Great Western Railway are the London and South Western Railway through service from Bournemouth to Birkenhead and return; the 10 on the Lancashire and Yorkshire Railway comprise two Great Central trains in each direction daily between Penistone and Bradford (one each of these appear against the Lancashire and Yorkshire Railway in the October, 1918, column, when the Lancashire and Yorkshire Company itself had no cars running), and three West Coast cars each way between Preston and Liverpool (Exchange). The North Eastern Railway four include a Great Northern service to and from Harrogate and a Lancashire and Yorkshire service between Normanton and York. Finally, the two "foreign" cars on the Dublin and South Eastern Railway are on the through Cork mail train of the Great Southern and Western Railway between Amiens Street and Kingstown. There are some other more trifling examples than these, but I have not thought it necessary to mention them.

In consequence of the extensive use made of Pullman dining and parlour cars, the Caledonian Railway has now reached a very high place in the list, and, in view of the class of traffic conveyed, the position of the London and South Western and Great Eastern Railways is also a most creditable one. It will be seen that all the companies operating cars in pre-war days, totalling 20, have resumed doing so, with the sole exception of the Midland (Northern Counties Committee of Ireland), but their place in the list is taken by the Cambrian Railway, who for the first time this summer placed in service a "Tea Buffet" train in each direction between Whitchurch and Aberystwith. At the last stage of the war the number of companies still using restaurant cars of their own had fallen to five (the Midland and Glasgow and South Western cars were actually worked by the Midland Company), and those using Pullman cars to one, the cars on the Caledonian and Metropolitan Railways being withdrawn, while the South Eastern and Chatham Pullmans were employed on military trains only. Consequently, as indicated at an earlier stage of this article, the restoration of these amenities of travel has been by far the most extensive and acceptable improvement effected since the termination of the war in the operation of British express train services. It is much to be hoped that by next summer a somewhat corresponding improvement will have been effected in the speed of the running.

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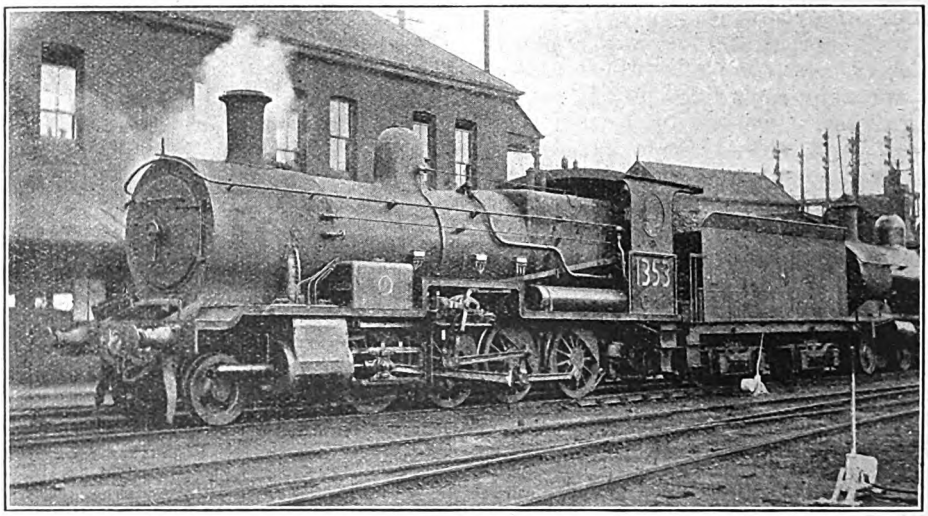

NEW SOUTH WALES GOVERNMENT RAILWAYS.
2-8-0 locomotive, No. 1353 (class "K") fitted with "Lucy" superheater and "Southern" valve gear.

New Consolidation Locomotive for the New South Wales Government Railways.

BY courtesy of Mr. C. F. Dewey, Sydney, New South Wales, a locomotive of the 2-8-0 or "Consolidation" type, recently constructed, by the Clyde Engineering Company of Granville, Sydney, for the New South Wales Government railways, as part of a contract for 300 new engines, is illustrated above.

This engine was designed for freight train operation by Mr. E. E. Lucy, Chief Mechanical Engineer of the system, and while New South Wales standard constructional practice has been generally adopted, a number of new features have been introduced. It is equipped with rocking fire-bars and drop grate, ash-pan hopper slides worked by steam, ash-pan washing apparatus, hot water smoke-box ash ejector, exhaust injector, and Lucy superheater (designed by the chief mechanical engineer). The boiler can be blown down while the engine is in motion.

"Southern" valve gear (developed on the Southern Railway, United States of America), with outside piston admission valves has been selected. This is believed to be the first appearance of the Southern gear in Australia, and also the first appearance of outside motion on the road engines of the New South Wales system.

This engine is designated No. 1353 "K" class, and is attached to the main running shed at Eveleigh. It bears the usual livery of the road (*i.e.*, black, with red lines and facings, with brass numerals on the cab-sides).

It is designed to run 500-mile trips without shed attention, the crews being changed on the road; and, since being placed in service, has been given some very heavy work to perform, with satisfactory results.

Leading dimensions are :—

Cylinders	... ...	22 in. × 26 in.
Driving wheels	...	51 in. d'a.
Leading truck wheels		33½ in. d'a.
Heating surface—firebox	...	174·4 sq. ft.
tubes	...	1,582·5 ,,
superheater		444·8 ,,
Total	...	2,201·7 ,,
Boiler pressure	... ...	150 lb. per sq.
Tractive effort	... ...	31,460 lb.
Total weight (engine and tender)	... ...	123 tons 12 cwt.
Total length (engine and tender)	... ...	60 ft. 10¾ in.
Gauge	... ...	4 ft. 8½ in.

The tender carries 14 tons of coal sufficient for continuous heavy haulage for 300 miles.

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The WHY and the WHEREFORE

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which, published in April, 1919, is out of print but a new one is in preparation, in readiness for publication in April, 1920.*

Railway Charges.

It is very unlikely that a railway company would raise an illegal charge, and still more unlikely that a trader would pay it if raised. The reason you give is, of course, no valid justification for an additional charge; if it were the railway companies would be able to make substantial increases under present conditions. The facts given are not sufficiently explicit to enable us to form a definite decision on the matter, and it seems to us that negotiations with the particular railway company concerned would soon settle the legality or otherwise of the charge. If there is anything illegal about it, then the trader would, of course, be fully justified in refusing to pay.

[Reply to JOHN T. MOSS.]

Central London Rolling-Stock on the Watford Line.

Owing to the impossibility of any progress being made during the war with the Central London Extension to Ealing, the Central London Railway found themselves with some amount of surplus rolling-stock intended for use on the Ealing Extension. On the other hand, the Bakerloo Line could not obtain delivery of the new stock ordered for the Watford Extension. It was, therefore, decided to utilise the surplus Central London Railway stock for the latter extension.

[Reply to "NORTHERNER."]

Dudley Hill—Lowmoor Branch, Great Northern Railway.

This line, together with the Great Northern goods depôt at Lowmoor, was closed October 1, 1917, with the object of economising staff and materials during the war. The branch, constructed from Pudsey Greenside, through Dudley Hill, to Lowmoor, was opened between those points on December 1, 1893, and formed an alternative route to that via Bowling Junction for trains between Leeds and Halifax, but latterly it had been very little used. We cannot say whether it is likely to be reopened.

[Reply to "FRETON."]

Train Stopping for Division.

In some instances a train which has to be divided calls at a station where it would not ordinarily stop. In the particular case you refer to the main train proceeds to Uckfield, the Tunbridge Wells portion being detached at Ashurst. This is a booked call for the train concerned, but in other instances stops for division may not be publicly advertised, and may be made at a signal cabin, away from a station, if that is more convenient.

[Reply to R. G. BAILEY.]

Nunhead-Greenwich Park Branch.

We do not see that any purpose would be served by extending the Greenwich Park Branch to join the South Eastern Line between Greenwich and Maze Hill as

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suggested, as passengers from the stations shown in your letter, viz., Strood, Gravesend Central, Dartford, Erith, Woolwich and Charlton can now travel to Cannon Street for the City, and Charing Cross for the West End. Moreover, it is not likely that the Greenwich Park branch will be reopened for traffic.

[Reply to R. C. BARKWAY.]

Permanent Way "Cautions."

A horizontal green board on two supports, with one end square and the other pointed, showing at night a white and a green light side by side, was until recently the customary method of indicating that drivers must reduce speed for permanent way operations, subsidences, slips, &c. The more common method at present in use was dealt with in the reply to R. E. Abbott in our August issue, under the heading "Reduced Speed Indications." See page 133.

[Reply to "PECKETT."]

Locomotive Names on the Midland (London, Tilbury and Southend) Section.

No. 80 *Thundersley* was the engine specially decorated at the time of the Coronation of King George, but did not bear the name "Coronation" as you suggest. Doubtless this was the engine seen by you at Upminster. We understand that a Dublin and South Eastern 2-4-2 tank engine is used for the garrison railway at Shoeburyness, while three of these were in use at Richborough during the war period.

[Reply to G. AIANO.]

London and South Western Railway Engines.

We have no record of any 0-6-0 goods tender engines having been built by this company during the period you mention, 1908–1914. The London & South Western Railway has not, by comparison with, say, the Northern trunk lines, a heavy goods service, and the mixed traffic 6 ft. 4-6-0 engines built since 1908 have doubtless amply met all requirements for increased tractive power in the goods department.

[Reply to "LADY HENDERSON."]

Speeds on Electric Railways.

In our experience the fastest running by electric trains round London is made by those of the London and South Western Railway, which we have timed frequently at speeds well in excess of 50 m.p.h. on a level track. The Liverpool-Southport service of the Lancashire and Yorkshire Railway has also some fast timings, such as Liverpool-Birkdale, 17¼ miles, in 23 min., which require high-speed running intermediately.

[Reply to W. G. PRICE.]

Route Used by Great Central Railway Trains: London—Harrow.

From Marylebone to Harrow South junction the metals used by Great Central trains are the property of the Great Central Railway, but at the south junction, 16 chs. on the London side of the station, the Great Central and Metropolitan Joint line commences, and includes the station itself. The construction of the Great Central lines involved the re-building of Harrow station.

[Reply to E. EVANS.]

4-6-4 Tank Engines, London, Brighton and South Coast Railway.

Our reply in the August RAILWAY MAGAZINE, under the heading "Snifting Valves," was based on a misapprehension as to what you actually referred to. We are informed by a Brighton correspondent that the sheet iron casing behind the chimney of No. 328, of above class, contains a portion of the feed-water heating apparatus with which that engine has been fitted.

[Further reply to "BALTIC."]

Midland Scottish Services.

You have not read your time-table with the greatest of care, or you would see that passengers are not conveyed from *London* to Edinburgh by the 8.50 a.m. or the 8.50 p.m. *ex*-St. Pancras—in pursuance of the war-time arrangement whereby all London-Edinburgh traffic is conveyed by the East Coast route. But what about passengers from other Midland stations to Edinburgh or beyond?

[Reply to L. W.]

Metropolitan Railway History.

St. John's Wood Railway was opened on April 13, 1868, with stations at St. John's Wood, Marlborough Road and Swiss Cottage, with a junction at Baker Street. The present circle platforms were at this time also in existence. The rolling-stock used on the St. John's Wood line in 1868 and the Harrow extension in 1879–

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1881 was of the ordinary compartment type.

[Reply to " J. V. H."]

Great Central Railway Locomotive Types

Engines built to the designs of Mr. H. Pollitt and Mr. Sacré, previous locomotive superintendents of this line, or, as it was then, the Manchester, Sheffield and Lincolnshire Railway, are still running on the Great Central Railway, but to enumerate their classes and duties would occupy far more space than we can furnish.

[Reply to " DEMOBBED."]

4-6-2 Superheater Tank Engines, London and North Western Railway.

These engines used regularly to work into and out of London, although we do not think that any of them are now stationed in the London district. The bulk of them are at present at work on the Preston-Carlisle section, a large number in particular being stationed at Tebay shed.

[Reply to W. G. PRICE.]

North Eastern Railway Locomotive Classification.

There is no material difference between either the " T " and " T 1 " (0-8-0) classes, or the " P2 " and " P3 " (large-boilered 0-6-0) classes on the North Eastern Railway, the distinctive lettering in these cases merely referring to the batches in which the respective engines were constructed.

[Reply to J. HOCKENHULL.]

Schull and Skibbereen Railway, Ireland.

This line has a total length of 15 miles, with eight stations in all. Locomotives number four, with 10 passenger and 45 goods vehicles. The line was incorporated in 1883, and constructed in 1886 to a 3 ft. gauge. All these particulars can be ascertained from the RAILWAY YEAR BOOK. We have no information, however, as to the quay accommodation at Ballydehob.

[Reply to " SUTTONIAN."]

Glasgow and South Western Railway Locomotives in the South.

We understand that several Glasgow & South Western Railway locomotives have been employed on southern lines in connection with the policy of distributing engines to suit traffic requirements, and presume the locomotive you saw on the Great Western and Great Central joint line is one thus transferred from the owning system.

[Reply to R. W.]

The 24-Hour Day.

This is already in use for Army purposes, and railways having traffic connection with Continental systems also employ it for train services across the Channel. Whether it will be adopted here remains to be seen, but we agree that it removes all possibility of confusion between a.m. and p.m. times, and public opinion is certainly tending in its favour.

[Reply to CAPT. H. E. EVERARD.]

4-4-0 Locomotives, London, Brighton and South Coast Railway.

There is a substantial difference externally between the appearance of the later *Billinton* large 4-4-0 engines, and the original smaller series, now re-built. The latter have extended smoke-boxes and the present standard chimney and boiler mountings, which have altered their general appearance considerably.

[Reply to J. HOCKENHULL.]

Condensing Locomotives.

Condensing apparatus is fitted to locomotives when it is necessary that they should not exhaust large quantities of steam in tunnels, as, for example, Midland and Great Northern trains passing over the widened Metropolitan lines between King's Cross and Moorgate. The Great Central Railway has no engines so fitted.

[Reply to P. H. V. BARNYARD.]

Steel Wheels for Coaches.

Pressed or cast steel wheels are now largely employed in the construction of coaching stock, and give out a characteristic " ring " when passing over rail-joints, as compared with the duller impact of the previous wood-centred Mansell wheels. The speed referred to in your letter, though exceptional, is not a record.

[Reply to W. E. SYDAL.]

" Uni-Flow " Cylinders.

It is the sudden escape of the steam behind the piston, as the uni-flow exhaust ports are uncovered, compared with the comparatively gradual exhaust as the piston " pushes " the expanded steam through ports of the ordinary type, that occasions the sharp exhaust to which you refer in the case of uni-flow engines.

[Reply to KEITH GILFILLAN.]

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South Eastern & Chatham Engines.

Nos. 658–675 are class "R" (old L.C. & D. section). Nos. 696–710 are class "R 1" (old L.C. & D. section—Kirtley's later type). Stirling's 0-6-0 tanks are class "R" (S.E. section). Kirtley's 0-6-0 tanks Nos. 600–609 are class "T." All these locomotives are still on the South Eastern and Chatham Railway List.

[Reply to K. PATON.]

2-8-0 Mixed Traffic Class, Great Western Railway.

As these engines are intended primarily for fast goods and heavy passenger service, rather than for mineral trains, we doubt whether they will be used to any extent on the Bristol-Salisbury route. Please note that our rules only permit of two queries per month from any one reader.

[Reply to "G. W. SAL."]

Changing Engines.

Locomotives are now changed more frequently on long through runs than in pre-war days, on certain lines especially. This is in order to restrict the mileage of engine crews in such a way as will enable them, as far as possible, to complete their daily duties within the period of eight hours.

[Reply to C. C. J. SIMMONDS.]

Rebuilt 4-4-0 Superheater Engines, Midland Railway.

We believe the 6 ft. 6 in. and 6 ft. 9 in. engines retain their original driving wheels when rebuilt. We understood that the Midland Company were to take over a few of the 2-8-0 R.O.D. engines, but as yet we have no record of any being thus transferred.

[Reply to W. H. C. CASSERLEY.]

Platelayers' Trollies through Tunnels.

See reply to "R.T.O." in August, 1918, RAILWAY MAGAZINE, p. 125. We have no further information on the subject. As regards your second query, the only source of this informaton would be an application to each railway individually, to whom we must refer you.

[Reply to "STAFF CAPTAIN."]

Great Northern Railway Engine Colours.

Passenger tank locomotives in the London district are once more being painted in the standard Great Northern Railway colours—bright green with black panelling and white lines. The dark grey colour with white lines was adopted for the war period.

[Reply to J. S. BALLS.]

Rhondda and Swansea Bay Railway.

Locomotive engines belonging to this line are as follows:—

5 engines 0-6-0 type.
18 ,, 0-6-2 ,,
3 ,, 2-4-2 ,,

The engines are being painted the standard colour of the Great Western Railway.

[Reply to S. WALLACE.]

Largest Signal Boxes: Glasgow and South Western Railway.

St. Enoch station box, electro-mechanical, points being worked manually and the signals electrically, has 488 levers, the highest total in any cabin in the United Kingdom. The companion box at Gorbals Junction is, we believe, the next largest on the system.

[Reply to A. W. A.]

No. 4700: Great Western Railway.

This 2-8-0 engine has sanding gear in front of the leading coupled wheels, as well as the trailers, though this may not have been very clear from the illustration. Examination of the original photograph does not support your suggestion that the chimney differs from the usual parallel pattern.

[Reply to T. D. THOMSON.]

Caledonian Railway Locomotives.

No. 60 is one of the most recent 4-6-0 engines of Mr. Pickersgill's design. Until the building of the new "60" series, the numbers 60-70 were held by 4-4-0 engines of Mr. Drummond's design, rebuilt by Mr. McIntosh in 1901 and 1902 to conform generally to the "Dunalastair I" class.

[Reply to "LADY HENDERSON."]

London and North Western Railway Locomotives.

Further "Prince of Wales" class locomotives are being placed in service, as mentioned in "What the Railways are Doing" in the August RAILWAY MAGAZINE, while no doubt additional "Claughtons" will be constructed in due course.

[Reply to R. A. LEATHLEY.]

Honiton Tunnel, London & South Western Railway.

Length now, as when constructed, is 1,353 yards. The "Railway Year Book" is correct in this respect. The other refer-

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ence work and the geography books to which you refer are wrong.

[Reply to R. S. JOHN.]

"Bakerloo"—Watford Electric Services.

The special rolling-stock designed for these services could not be delivered during the war, and therefore Central London Railway motor coaches, intended for the through Ealing services, are used with London Electric trailers until the new stock is available. [Reply to G. H. W.]

A Great Eastern Railway Locomotive Query.

So far as we know, the small "diamond" let into the smoke-box door of the 4-6-0 engine you have seen has no working significance; it is probably a decorative effect on the part of the driver.

[Reply to G. E. CASTELLAN.]

A Central Station for Cardiff.

Reconstruction and enlargement of the Great Western Railway station at Cardiff will no doubt come up for consideration in due course, but we know of no special plans for a central station to be used by all railways entering Cardiff.

[Reply to "CARDIFFIAN."]

Falmouth Boat Trains.

Specials were run during the war, but were scheduled in accordance with war-time standards as regards speed. They stopped at Truro, Plymouth (North Road), and usually at one other station between there and Paddington.

[Reply to "PADSTOWNIAN."]

Periodical Stops.

Special stops of passenger trains on intermittent dates are by no means unusual, and are designed to meet certain local circumstances. They are not, however, always advertised in the time-tables, as in the case to which you refer.

[Reply to L. W.]

London Electric Railways.

At the present time no authoritative reply can be given to your first question. As regards London Electric trains running beyond Hammersmith, the only possible explanation may be in the case of a test train. [Reply to L. C. N.]

Tunnels on the Great Northern Railway.

You are correct in pointing out that Peascliffe Tunnel, situated between Grantham and Barkston, should be added to the list given on pages 131 and 132 of the August number.

[Reply to E. H. WAYNE.]

2-6-0 "4300" Type Engines, Great Western Railway.

These locomotives are frequently employed on passenger service, and we believe take their turns, when required, in working the "Cornish Riviera Express" west of Plymouth.

[Reply to "PADSTOWNIAN."]

Great Western "Atlantics."

There are only three 4-4-2 engines on the Great Western Railway—Nos. 102, 103 and 104, the French compounds. All the Swindon-built 4-4-2 engines have been converted to the 4-6-0 wheel arrangement.

[Reply to "CORNISH RIVIERA."]

Great Western Railway Locomotive Weight Classification.

A small red letter beneath the number plate of a Great Western Railway locomotive indicates its weight classification for engineering purposes.

[Reply to "PECKETT."]

Caledonian Railway Locomotives.

Usually the first-built engine of a series is considered as the class representative, so that it would be correct to refer to Mr. J. F. McIntosh's intermediate series of 4-6-0 engines as the 908 class.

[Reply to A. A. TORRANCE.]

London and South Western Railway Locomotives.

We know of no tank engines having been designed by Mr. R. W. Urie, the present Chief Mechanical Engineer of this railway.

[Reply to "G. W. SAL."]

London & South Western Electrified Lines.

White diamond and white and black diamond posts are placed alongside the line to indicate where the current should be cut off by the motorman.

[Reply to R. S. JOHN.]

Watering the Coal.

We presume that the practice of watering the coal with a hose, adopted by firemen, is in order to keep down the dust.

[Reply to T. H.]

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Load Classification.

North British Railway engines now bear a small letter plate above the number plate denoting the classification for loading and train control purposes.

[Reply to KEITH GILFILLAN.]

2-6-0 Locomotives: Glasgow and South Western Railway.

These are mainly used, we understand, for operating heavy goods and mineral trains on the main routes.

[Reply to A. W. A.]

Midland Railway History.

Ten Midland trains ran each way over the Great Northern Railway between King's Cross and Hitchin, in the summer of 1868.

[Further reply to CAPTAIN G. CULLIS.]

Largest Locomotive, London, Brighton and South Coast Railway.

Nos 327 " Charles C. Macrae " and 328 (unnamed) 4-6-4 tank engines are the largest locomotives on this railway.

[Reply to C. J. M.]

Proposed Line from Torrington.

It is impossible to say whether the proposed line from Torrington to Okehampton or Halwill will be constructed or not.

[Reply to R. S. JOHN.]

Track Circuiting.

Wires connecting the two rails at a rail-joint are in order to complete a track circuit for signalling purposes. They are technically known as " rail-bonds."

[Reply to H.R.T.T.]

Great Northern Railway Locomotives.

There are no 4-6-2 engines on the Great Northern Railway, either tender or tank.

[Reply to R. G. BARLOW.]

Railway Literature.

RECORD No. 93. WAR INDUSTRIES. BALDWIN LOCOMOTIVE WORKS.

These records are always welcome, and that now to hand deals with the war activities of this famous American locomotive works. Particulars are given of shells manufactured for the British Governments, as well as for the United States armies, of military rifles manufactured at the Eddystone Rifle Plant, and of 14-inch navy guns mounted on rail carriages, and having a maximum effective range of 30 miles; and of 7-inch guns fitted on caterpillar mounts, and other forms of war industry. Altogether 6,565,355 shells, 1,863,900 cartridge cases, 1,905,213 miscellaneous ammunition items, and 2,200,000 rifles were turned out. It is, however, the locomotive output which is of primary interest, and the following classes may be mentioned:—0-6-6-0 Mallet for Vologda—Archangel Railway, Russia; 2-10-0 for Russian State Railways; 0-6-0 T gasolene for the Russian Government; 0-6-0 T, 0-4-4-0 " Pechot," 0-6-2 T, 0-4-0 T fireless, and 0-4-0 T gasolene for the French Government; 2-8-2 for the P.L.M. Railway; 2-8-0, 4-6-0, 0-4-0 T, 0-6-0 T, 4-6-0 T, and 2-6-2 T for the British Government; and 2-6-2 T, 2-8-0 (Pershing locomotive), 0-4-0 T gasolene for the United States Government. The aggregate value of war contracts executed and delivered by the Baldwin Locomotive Works and associated companies was approximately $250,000,000.

MOTOR TRANSPORT YEAR BOOK AND DIRECTORY. Vol. IV. Electrical Press, Ltd., 13—16, Fisher Street, Southampton Row, London, W.C.1. Price 12*s.* 6*d.* net.

Although delayed somewhat owing to labour difficulties this useful annual will be welcomed by all interested or directly concerned with motor transport, and that is now a very large portion of the community. It was founded in 1916 to meet the need for a financial and descriptive record of British motor transport undertaking, and their associated manufacturing concerns. Particulars of 303 limited liability companies, 74 municipal bodies and 109 private firms engaged in motor transport business are now included, while the number of manufacturing concerns dealt with is now 470.

Section I contains the record of motor transport undertakings. Section II relates to manufacturing concerns. At the end of the section, there is an Appendix giving particulars of over 60 associations, insurance companies, and organisations connected with the motor industry. There is also a Geographical Index giving the names of motor transport undertakings according to districts served. The number of districts included in this section is 790. Section III is devoted to a Directory, containing the names and addresses of over 3,000 directors and officials.

In view of the extensive use now made by railways of road motor vehicles most of the leading railway companies receive adequate reference as required.

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New 4-6-2 Locomotive, Canadian Pacific Railway.

OUR frontispiece illustrates a new 4-6-2 express locomotive placed in service by the Canadian Pacific Railway. Sixteen are being built at the Angus Shops, Montreal, at the rate of one for every five and a-half working days. They are the largest and heaviest passenger locomotives in the Dominion, and were specially designed and constructed under the direct supervision of Mr. W. H. Winterrowd, Chief Mechanical Engineer.

Total weight of engine and tender in working order is 480,000 lb.; cylinders are 25 in. by 30 in.; diameter of driving wheels is 6 ft. 3 in., and the boiler carries 200 lb. steam pressure, giving a tractive effort of 42,000 lb. The superheater boilers are very large, each containing approximately 5,000 sq. ft. of heating surface. The tender holds 8,000 Imperial gallons of water and 12 tons of coal. The engines are equipped with a vestibule cab which completely protects the enginemen from bad weather.

The new locomotives are to be used in the passenger service between Fort William and Winnipeg, and between Smiths Falls, Trenton and Havelock. They are sufficiently powerful to eliminate the necessity for running passenger trains in two sections—one of the new engines being able to handle the number of cars that it formerly took two locomotives to draw.

One of the first of these engines is shown attached to the Prince of Wales' royal train illustrated on another page.

James Watt Centenary.

AT the age of 83 years, James Watt died on August 19, 1819. At the instance of the James Watt Centenary Committee the Centenary was celebrated on September 16, 17 and 18 by suitable commemoration.

As an International Memorial to commemorate the Centenary, it is proposed (1) To endow a Professorship of Engineering, to be known as the James Watt Chair, at the University of Birmingham, for the promotion of research in the fundamental principles underlying the production of power, and the study of the conservation of the natural sources of energy; (2) To erect a James Watt Memorial Building, to serve as a museum for collecting together examples of the work of James Watt and his contemporaries, Boulton and Murdoch, illustrating this interesting epoch in the history of engineering. The building would also serve as a meeting-place and library for scientific and technical societies, and be a centre from which engineers could co-operate in spreading scientific knowledge; (3) To publish a Memorial Volume. The President of the General Committee is the Rt. Hon. the Lord Mayor of Birmingham, Sir David Brooks, G.B.E.; The Chairman, Mr. Wm. Mills, M.I.Mech.E., and the Hon. Secretary, Mr. R. B. Askquith Ellis, A.M.I.Mech.E. Considerable support has already been promised, all the principal engineering institutions and many leading firms having appointed representatives to the committee. Further particulars will be supplied to all interested by the Hon. Secretary, James Watt Centenary Committee, Chamber of Commerce Buildings, New Street, Birmingham, and subscriptions to enable the Commemoration proposals to be realised are invited.

James Watt was born at Greenock in 1736, and his first great work was to improve Newcomen's imperfect and wasteful steam engine into a relatively powerful and economical machine. In 1767 he first visited Birmingham, and in 1768 became associated with Matthew Boulton, the two commencing business in partnership in 1775. Although James Watt is best remembered for his services in regard to the steam engine and particularly for his inventions of the separate condenser and the indicator, he was a clever mechanician and a scientist of no mean ability; and to him, in conjunction with Matthew Boulton, and later William Murdoch, are due many of the important steps in progress which left the steam engine in 1800 including nearly all the features with which we are to-day familiar.

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capacity of the [illegible] enlarged to the extent of over 1,000,000 more passengers per day.

The approximate figures are :—

	Daily mileage increased by	Daily carrying capacity increased by
Buses ..	74,097 miles.	667,000 passengers.
Trains ..	44,414 ,,	270,000 ,,
Tramways	—	100,000 ,,

On the railway side there have been greatly accelerated services, additional through trains to such places as Southend and Watford, increased facilities for reaching the up-river resorts, and special theatre trains during the evening " rush " hours. In the case of the 'buses, there has been an augmentation of the fleet by 709 vehicles, including 168 lorribuses (obtained from the War Office stock) and 72 khaki 'buses restored to London traffic after long service in the war zone. At the time of the Armistice there were only 1,758 buses on the streets, 1,319 having been surrendered for war purposes; the number now running, thanks to speedy repair work, is 2,467, and the daily mileage covered has increased from 199,240 to 273,337. Nearly all the pre-war services in town and country have been restored, and the system speeded up generally. More frequent tramway services have also been provided, the Metropolitan Electric fleet of cars having been increased from 187 to 212, and the London United from 141 to 180.

New Construction for the " Underground."

New construction is being rapidly carried out to meet the growing needs of all the services. A hundred new Underground cars are on order, as described recently in these pages. The new motors will be capable of developing a speed of 45 miles an hour on non-stop runs. New omnibuses, as described last month, are also on order, and will, it is hoped, be delivered next year at the rate of 50 per week. The estimated cost of the

Brighton " Singles " on the Portsmouth Line.

INTEREST continues to be manifested in the locomotive history of the London, Brighton and South Coast Railway, and arising out of Mr. Ahron's articles on this subject, recently completed, part of a letter in reference to the various " single " engine designs used on the Portsmouth line may be referred to. The writer, Captain G. Cullis, remarks on the apparent unsuitability of this route for " single " engines, though some of them were expressly designed for this traffic, with its many severely graded sections and numerous service slacks. Mr. Ahrons points out, however, that many of the grades are not unduly long and could, therefore, be taken " at the run." Captain Cullis remarks :—

" I fancy that by the later 90's these engines, true Stroudley's as they were in excellence, must have frequently been overloaded, especially during the summer months, and piloting was, in fact, often resorted to. I have record of a run in the summer of '99 on the 11-35 a.m. Victoria–Portsmouth fast, when the engines were two ' G ' class singles. Unfortunately no further particulars are available. In this connection it might be mentioned that piloting became somewhat common in the period 1899–1903, and I have notes of several cases of trains being worked by two ' D ' class 0-4-2 tanks, the 11.37 Portsmouth (semi-fast) to Victoria frequently having this combination in summer. Piloting on the London, Brighton and South Coast Railway is now almost as rare as on the Great Northern Railway.

" It is recorded that the last main line duties performed by the last survivor of the ' G ' classsingles—*i.e.*, No. 329, *Stephenson*—was the working of the Sunday Eastbourne Pullman Express. It may be interesting to note that in 1914 (*i.e.*, just prior to being broken up) the writer regularly saw this engine working the 3.45 p.m. Victoria-

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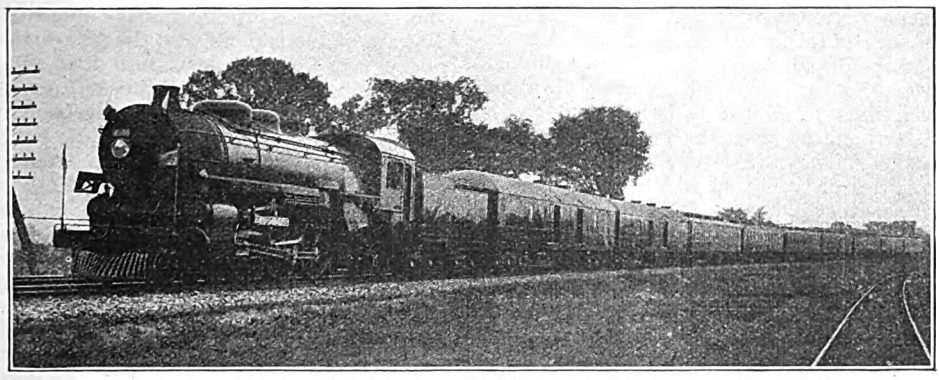
Tunbridge Wells fast (first stop Groombridge) so that it is probable this was its last regular working."

Canadian Royal Train.

A SPECIAL train has been built by the Canadian Pacific Railway for the use of H. R. H. the Prince of Wales while in Canada. It consists of steel cars, together with the private cars of Lord Shaughnessy and Commander J. K. L. Ross. It represents a wonderful advance in railway construction since the last royal train was run for King George. Wood is only used in the cars for interior decorations or lesser purposes of inside construction. It is said to be the most costly train on the American Continent, as well as the most modern.

The Prince of Wales himself travels in the car *Killarney*, while the names of other cars on the train are *Cromarty*, *Empire*, dining-car *Canada*, two sleeping-cars, the *Carnarvon* and *Chester*, and the car *Chinook*, with two steel baggage cars at the head of the train. The Prince of Wales is spending about two months on the train, the car *Killarney* being his headquarters throughout the trip. Nothing in the way of comfort has been overlooked, from the handle set at the Royal bedside to regulate the temperature of the state-room to the telephone that brings him in touch with all parts of the train. In order to distinguish it from all other cars, the *Killarney* bears the coat-of-arms of the Prince of Wales.

Locomotives of the class illustrated by the frontispiece are being employed for working the royal train.



H.R.H. The Prince of Wales' Royal Train: Canadian Pacific Railway.

The Glasgow & South Western Railway and the War.

IN its full extent of 500 miles, the system of the Glasgow & South Western Railway serves a number of important towns and industrial districts situate between Glasgow and Largs, on the north, and Carlisle and Stranraer, on the south.

Owing to its location, the Glasgow and South Western Railway was called upon to render services of many different kinds, and on a distinctly considerable scale, and the story of the results accomplished compares not unfavourably with those attained by companies possessing greater mileage and more extensive resources.

The number of special military trains run on the company's system from the outbreak of the war to December 31, 1918, was 1,116, conveying 7,444 officers, 144,066 men, 31,025 horses, 475 vans of stores and baggage, 310 military vehicles, 3,337 cycles and 134 motors. Of ambulance trains from England, a total of 40, conveying 4,937 patients, were run during the war period to destinations on the Glasgow and South Western system.

Greatly increased numbers of workpeople were carried in proportion as more and still more factories for the production of munitions and other military or naval requirements were opened in many different parts of the system. A maximum of 20 trains per day was set aside in the case of the Gretna factory for the conveyance of workers thereat from and to Dumfries, Annan and Carlisle.

Utilisation by the Admiralty of various ports on the system led to large quantities of coal having to be worked to those points from the South Wales collieries, the quantities so carried by rail becoming greater still as the shortage of vessels for sea transport grew more acute. From the outbreak of the war to December 31, 1918, 60,000 wagons of Welsh coal were thus dealt with, exchanged from English companies at Carlisle, to which point the empty wagons had to be returned.

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Diversion of shipping from East to West Coast ports, and the adoption of the "convoy" system, entailed haulage of traffic for longer distances than before. This was especially the case in regard to cargoes of iron ore. The Glasgow and South Western Railway conveyed a total of over 336,000 tons of timber cut down in the vicinity of their stations.

Munition and Camp Traffic.

As regards munition traffic, among establishments which provided large volumes of traffic were included the National Projectile Factory, Cardonald (shells); the National Filling Factory, Cardonald; the National Projectile Factory, Renfrew; the Shrapnel Factory, Renfrew; H.M. Factory, Irvine; the Standard Chemical Works, Irvine; the Misk Factory, Ardeer, Stevenston (ammunition); the Aerial School of Gunnery, Loch Doon, Dalmellington; the Aerial School of Gunnery, Turnberry; Messrs. Nobel at Ardeer (explosives); and H.M. Factory, Gretna. Of these various establishments the greatest of all was the last-mentioned. Gretna Factory covered an area of about 11 sq. miles, and the Glasgow and South Western shared with the two other leading Scottish railways in carrying the prodigious quantities of traffic to which the setting up of the factory led.

Mention may also be made of the large training camps established at Gailes and Irvine; the salvage dump at Renfrew, and the magazines for the storage of explosives at Perceton (Dreghorn) and Dalricket (New Cumnock). Altogether, the tonnage for Government Departments on which no carriage charges were made, or, if raised, were subsequently cleared, in the last three years of the war, were: 1916, 189,581 tons; 1917, 770,034 tons; 1918, 776,821 tons. During the same three years the company carried 17,000 horses for the War Office and 20,000 head of cattle and 79,000 sheep in connection with the control exercised by the Ministry of Food.

The number of steamships owned at the outbreak of war was nine, and the whole of these were taken over by the Government either for the conveyance of troops or for use as mine-sweepers. Two of them were lost. Troon Harbour was taken over by the Government for the duration of the war. It was used by them mainly as a base for mine-sweepers. The number of men employed at the outset of the war was 9,804. Of these, 2,410, or 24.58 per cent. of the total, had joined His Majesty's Forces down to November 10, 1918. The number of those who gave up their lives for their country was 296.

The War Record of French Railways.

In completion of references to the war record of services rendered by railways the following particulars applying to the French railways must be of interest, based upon articles by General de Lacroix, published recently in the *Revue des Deux Mondes*.

"The supreme test of French railway efficiency began on the night of August 2, 1914, when general mobilization of the French Army was ordered. The Paris-Lyon-Mediterranée system alone was obliged, for a period of 17 days, to provide over 3,000 trains. Between August 2 and 5 the Orleans system handled 1,500 trains; and, from August 2 to 8, the Eastern railway system, in addition to getting the mobilized men within its territory to their destination, had to transport 40,000 foreign workmen employed in the mines of Briey and Longwy who could not remain on the frontier exposed to the Germans. On the lines serving the north of France on August 9, 10 and 11, 1914, the Eastern company alone operated an average of 400 trains daily, the trains running on certain lines on less than four minutes headway and less than a mile and a quarter apart. And one must not forget, General de Lacroix points out, that even while handling these huge numbers of French troops, the French railways were also providing transportation for the British Army which began to land in France on August 7. From the 12th to the 20th 420 trains carried 260,000 British soldiers, with all the accompanying war material, inland from Boulogne and St. Nazaire without the slightest hitch.

"During all this time of terrific stress the railways were working under the serious handicap caused by the capture of large numbers of locomotives and cars by the Germans. The net loss, however, was somewhat reduced by the acquisition of 7,000 Belgian cars and 3,000 captured German cars.

"During the first six months after America's entry into the war the Orléans railway system transported from St. Nazaire to points inland 12,000 American officers, 460,000 men, 22,000 horses, 200 waggons, and 25,000 tons of material.

"A further emergency arose following the great Italian crisis on October 23, 1917, the day when the enemy penetrated south of Plezzo. The Paris-Lyon-Mediterranée railway company was asked by the military authorities to collect within 24 hours crews and cars necessary to transport immediately beyond the Alps 120,000 British and French troops, with all their artillery and material. Less than 24 hours after the receipt of the order, 500 locomotives and 12,000 cars departed from points all over the network of the

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company's lines towards the zone of embarkation of the troops. One day later the assembled trains were ready. On the 28th, the 12,000 cars started and, for four days, stretched between the French front and the Trentino. On November 8 the Italians, having carried out their retreat, were enabled to stop in complete safety on the Piave, assured of French and British reinforcements."

Railway Working in Macedonia in War Time.

To Captain J. N. Phillips the RAILWAY MAGAZINE is indebted for particulars of railway working under war conditions in Macedonia :—" At the time of the Armistice one of the three railways was being worked entirely by the British—the J. S. C. line as far as Doiran. This line has since been opened right through to Constantinople. It is single throughout, with passing loops at most of the stations. The first part of the run after leaving Salonica might, with a little imagination, be likened to the Great Western Railway Exe Valley Line for a mile or two, where it runs among gardens and orchards beside the River Galiko. This effect is heightened by the daily presence of Great Western engines. The principal stations are Salamanli (junction for the Gyvesne and Sarakli branch, built by the British), Kukush (junction for Snevche light railway), Kilindir (junction with loop from Vardar line), Doiran, Demir-Hissar (near Rupel Pass), Seres, Drama, Dedeagatch, &c.

" The variety of rolling-stock in use baffles description. Besides existing stock of the Orient, Monastir and J.S.C. lines and wagons imported by the British and French, one may see on any train trucks and vans belonging to the Greek, Serbian, Bulgarian, Roumanian, Hungarian and Bavarian State Railways. Since the Armistice there has been some through working, and there are now to be seen a number of Belgian State trucks with inscriptions on them in German, Bulgarian and Turkish. There is in existence some fine passenger stock of international standard belonging mostly to the Royal Serbian State Railways; but most of the valuable carriages have been used for the hospital trains. Some of the four-wheeled coaches (of Belgian make) are very good, but of the rest the less said the better.

" The locomotives, as might be expected, are also a scratch lot. The total engine power originally taken over by the British authorities consisted, if I am not mistaken, of about half a dozen each of 4-6-0 and 0-8-0 tender engines, most of which were standing on the 'derelict' road in the J.S.C. yard at Salonica. There were also two 0-6-0's. The British on taking over the line proceeded to import engines and fill up some of the vacant numbers. Nos. 1–13 are 0-8-0 tender engines with outside cylinders and valve gear, and wheels about 4 ft. 6 in. diameter, built at Vienna in 1894. At present only Nos. 7 and 13 are running. Nos. 21–24 are London and South Western Railway 0-6-0's, too well-known to need

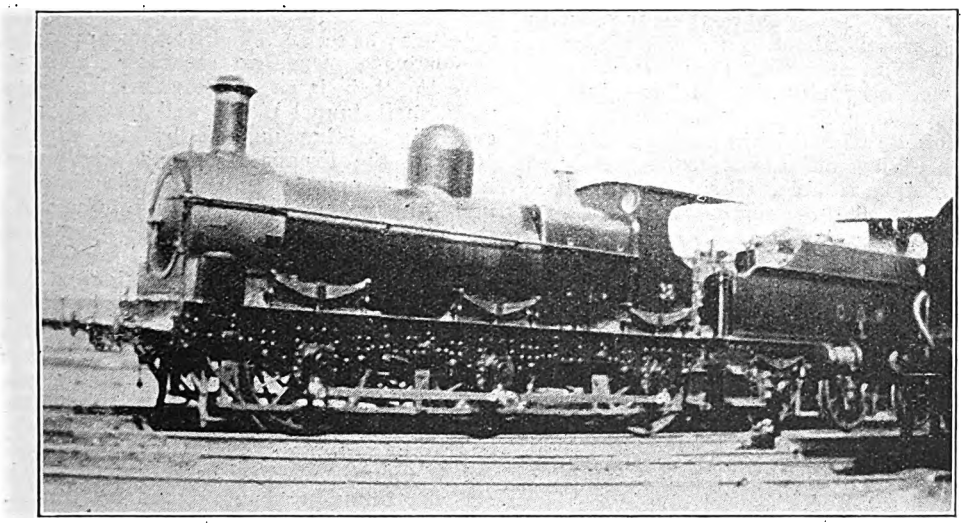

Photo.] [*J. N. Phillips.*

GREAT WESTERN LOCOMOTIVE IN SERVICE ON THE SERBIAN RAILWAYS.

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description. Their original numbers were, I believe, 157A, 175A, 435A and 511. Nos. 30–43 are standard Great Western Railway double-framed goods engines. Nos. 36 and 38 were usually set apart for working the hospital trains, and were always kept up to pre-war standard of cleanness and polish. Nos. 51 and 52 are outside-cylinder 0-6-0's of the original stock. The next series are the 'Terriers' of the line, a series of American-built 0-6-0 shunting tanks numbered 60–65, with 4ft. wheels. They are powerful for their size and popular with their drivers, by whom they are known as the 'Goats.' Nos. 71–83 are Great Western Railway goods engines, a later type than the '30' class, with inside frames, large boilers and top feed. Many of them were brought from France. Nos. 101–110 are 4-6-0 express engines, with driving wheels about 6 ft. 6in. diameter, built at Winterthur in 1894. How many there were originally I do not know, but the only ones at present working are Nos. 105 and 108 for the British, and 110 for the French. They all seemed to have suffered from firebox trouble. Besides these there are Nos. 01-08, 2-6-2 engines with 4 ft. 8 in. wheels, by the American Locomotive Company. The third pair of coupled wheels are the drivers. They are fitted with the Westinghouse brake, while the original J.S.C. engines have a simple vacuum brake, with ejector fitted on top of the boiler.

"Needless to say, with so many varieties of rolling-stock the continuous brakes are not used. The assortment of engines described above is, however, nothing to the medley to be found on the lines worked by the French. Every conceivable type can be seen, from French 'Midi' engines of extreme and unfathomable antiquity to the big 'Mikados' built in 1915 for the Greek State Railways. I once saw a small 4-4-0 outside-cylinder tank engine by Neilson and Co., dated 1876, bearing the number 301, but whose number this was I had no means of finding out. This was two years ago, and I have not seen it since."

In a subsequent communication Captain Phillips states that the railway is now working right through to Constantinople, and was taken over by the French authorities with a view to restoring control to the French company that previously ran it. Further passenger rolling-stock has been worked through from the Bulgarian State Railways since the Armistice.

Railway Working in Belgium.

DEALING with conditions in Belgium since the Armistice "Reader since 1908" sends some interesting particulars:—

"The most noticeable feature is, of course, the presence of German locomotives and rolling-stock. All types of locomotives are represented but the most common appear to be:—

"(1) Mixed traffic 4-6-0's, two-cylinder simple, superheater, with wheels about 6 ft. in diameter. They are to be seen on all classes of train, including the Paris–Brussels express.

"(2) 0-8-0 engines, varying from the latest Prussian State type built during the war to older, smaller designs dating from the early 'nineties. They are to be seen on goods and slow passenger trains and their number is legion.

"Two-cylinder compounds are much in evidence, chiefly older engines, including 2-6-0's and 0-6-0's. I have seen one or two Oldenburg engines with Lentz pop valves.

"Outside Brussels a huge collection of all types may be seen. The Prussians appear to predominate. One can recognise them at once by their large diameter smoke-boxes with small funnel placed well forward and generally overhanging the leading wheels. Most of the Prussians have a feed-water heater and pump mounted on the running plate, the heater being fed by a branch from the exhaust. All the joints blow plenty of steam! Many of the German locomotives are in poor condition, rusty and leaky, and they knock badly when running.

"The Belgian locomotives have fared badly during the war. Those who knew them before the war will remember their extremely smart appearance, with copper capped funnels, brass rings round the boiler clothing, brass beadings to the splashers and cab windows, &c. Few have come through the war retaining their original brightness. The Germans, in their quest for copper, stripped the engines of most of their decorative brass fittings, including the funnel caps, and painted them a uniform war black. Moreover they appear to have worked most of the engines to a standstill, then placed them aside to rust. At most of the depôts, notably at Brussels and Ghent and Bruges, can be seen sidings full of mutilated Belgian locomotives awaiting repairs—the most recent designs, including the large and beautiful 4-6-2's and 2-10-0's, and the old infinitely diversified types of the 'eighties and 'nineties, with huge funnels and short wheelbases. The 0-6-0 type is the most frequently seen upon the road at present. There are about a dozen varieties of it. The large four-cylinder 4-6-0's are scarce for some reason.

"Some reasonably good speeds are being made now on some of the trains. I timed a train going from Brussels to Antwerp recently at 55 m.p.h. This train does the journey in an hour, with one stop at Malines and a slow to walkiug pace for a temporary

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bridge over a canal. It is almost invariably taken by a Prussian State two-cylinder superheater 4-4-0, with large wheels (about 6 ft. 9 in.). The stock consists of Belgian bogie corridor coaches, as used on the principal trains before the war (the *trains bloc*), together with a few German six-wheelers.

"Travelling from Brussels to Tournai one usually is drawn by one of the massive Prussian mixed traffic 4-6-0's, and the train is composed of heavy German vestibuled corridor coaches, some of them in new condition and very comfortable, but lacking somehow the finish of a first class twelve-wheeler on, say, the London & North Western Railway. All the German coaches are plentifully provided with notices informing the traveller what he must or must not do as the case may be.

"In the town of Ghent a temporary line has been relaid alongside the old permanent one, and running for part of the distance through the streets of the town and through the station square in front of the station entrance! The locomotive puffs along down a boulevard while the townspeople walk along the pavement behind a barbed wire fence."

Some Locomotive Notes.

FROM Oxfordshire, Mr. E. Little conveys to the RAILWAY MAGAZINE some noteworthy remarks concerning the locomotive working that has recently come under his observation. He writes:—"I learn with interest that the Great Western Railway Company has recently acquired some twenty 2-8-0 goods engines of the standard Great Central Railway pattern originally intended for service overseas. They are numbered in the "thirties" *i.e.*, from 3000 upwards, and No. 3010 was recently observed passing Heyford on a down goods train. It was painted all black, buffer beams included, and the outstanding features were the Westinghouse air pump on the right side of the smoke-box, the two lifting jacks fixed vertically on either side of the smoke-box and the side chains on the buffer beams. About six of these engines are stationed at Banbury shed which harbours a number of goods engines of the "26" "28," "43," and 0-6-0 classes.

"For some time past no passenger trips other than the autocar services to Kingham and to Princes Risborough, have been worked by Banbury engines. When the new line was opened on July 1, 1910, I remember two 7 ft. 8 in. singles being sent to Banbury to work London trips, one 'link' being so arranged as to return with a down express from Paddington at 4.42 p.m. via High Wycombe and Bicester, this being the only occasion on which the 4-2-2 engines ever ran over that section of the line. The train was very easily timed and never loaded to more than 3 eights, and from a log taken about a week after the new line was opened I observed that 3007 'Dragon' simply played with the train, making the arrival at Bicester about 3 min. early. The London and Banbury express service by the direct route is now always worked by 4-6-0 engines of the '29' and '40' classes, and I have not seen a 'County' or a 'City' at Bicester since pre-war days.

"Great Central Railway engines are not seen south of Banbury now-a-days. When the through services were in operation five or six years ago Leicester men worked regularly to Oxford on the through trains, and correspondingly the Great Western Oxford men often worked on turns through to Leicester. in fact, I believe, all the 'top link' at Oxford learnt the road beyond Banbury Junction. Many types of engines were employed, and I have seen 7 ft. 8 in. Singles, 'Barnums' (2-4-0 3206 class), 'Flowers,' 'Cities,' 'Counties,' and the French compounds on the Oxford-Leicester trains. For many years past a Great Western engine has worked nightly to Leicester on the 9.10 p.m. ex Swindon. Formerly Bristol engines were employed, but as the trip was rather long the job was given to Swindon men. At the present time a 'County' or a 4-6-0 '29' class is always on the train. It returns from Leicester at 1.18 a.m.

"At Oxford are stationed the three famous French Compounds which are kept regularly to the heavy London expresses, one turn (and perhaps the heaviest) being the 4.15 p.m. ex Swindon returning with the 7.30 p.m. from Paddington to Oxford. The secondary trips worked from Oxford are performed by a group of 4-4-0 engines of the 'Flower' and 'Bulldog' classes, whilst spare engines comprise 2-4-0 engines of the 'Barnum' class, and two of the inside framed 3232 class fitted with audible signalling apparatus for working on the Fairford Branch. An Oxford 'Flower' was sent to Bournemouth (London and South Western Railway) in May to work the Bournemouth-Birkenhead express as far as Oxford, reaching that city at 12.50 p.m. and returning at 2.18 p.m. This strikes one as a curious piece of locomotive working. In pre-war days a London and South Western Railway engine always came to Oxford on this train, and it was surprising to find that the old arrangement was not adhered to when the service was revived."

The International Railway Association.

As mentioned on another page, the "International Railway Congress Association," whose operations had necessarily

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been suspended during the war, will shortly resume its activities, and we are now informed officially that it has been reconstituted under the title of the "International Railway Association." The International Railway Congress Association was one of the earliest of the now numerous international scientific societies. It was inaugurated in connection with the congress at Brussels in 1885, convened by the Belgian Government for the purpose of celebrating the fiftieth anniversary of its railways. At this first assembly, as well as during the sessions which followed, the delegates occupied themselves exclusively with the study and discussion of a number of technical or administrative questions having as their object the progress of railway science. Arising out of this a permanent Commission was appointed by the first congress and assembled at Brussels on February 20, 1886, when a draft list of statutes was prepared, the final text adopted at Milan session in 1887 forming the basis for the permanent constitution.

The Association is composed of administrations of State railways, and concessionary or exploiting administrations of railways of public interest, having a minimum extent of 62 miles for mechanical or electric traction, or 31 miles in the case of rack railways or analogous lines. The Association is represented by a permanent Commission, which it elects, and which has its seat at Brussels. This commission is at the present time composed of ex-presidents of the sessions, who are members *ex-officio*, and 45 elected members. Its president is Mr. V. Tondelier, Presiding Director of the Executive Committee of the Belgian State Railway, and its General Secretary Mr. L. Weissenbruch, Chief Engineer and Managing Director of the same railway.

The principal changes in the provisions of the statutes, which experience has proved to be advisable, are regular intervals of five years instead of two years between the sessions, the limitation of questions to four for each of the five sections (way and works, locomotives and rolling-stock, working, general and light railways), and the nomination for each question of several reporters, one for each group of countries.

Special Sessions.

SESSIONS were held at Brussels in 1885; Milan in 1887; Paris, 1889; Petrograd, 1892; London, 1895; Paris, 1900; Washington, 1905; and Berne in 1910. In 1885, 131 railways were represented, and in 1910, for the Berne session, the number had grown to 420. The Association published up to 1914 a monthly bulletin, containing, besides original articles upon all questions relating particularly to the technique, working and organisations of railways, reproductions of the most interesting articles appearing in the railway reviews of the whole world, and detailed reviews of works dealing with railway affairs. The bulletin likewise contained reports of questions to be dealt with during the sessions of the Association, as well as full accounts of the discussions. Edited in the French language since its inception in 1887, the bulletin has also issued an English edition since 1896.

At the closing sitting of the eighth session (Berne, 1910), when the twenty-fifth anniversary of the foundation of the Association was celebrated, it was decided at the final general meeting that the ninth session should take place in Berlin in 1915. The preparations for this session were far advanced in 1914 when the declaration of war by Germany on Belgium was made. The invasion of the country and the measures taken by the occupying Powers, resulted in the paralysis of activity on the part of the Association for nearly five years.

After the return of the Belgian Government the Association was placed under sequestration, in pursuance of the Belgian law of November 10, 1918, owing to the fact that a portion of its assets belonged to the subjects of enemy nations. The sequestrator having ordered the dissolution and liquidation of the Society, the railway administrations, members of the Association, belonging to 35 countries in and outside Europe, decided to transfer their property to an Association established upon exactly the same basis as before, and entitled the "International Railway Association."

The statutes of the original Association, now dissolved, have not been altered. All that has been done has been to add to them an article in the following terms:—

"The Permanent Commission by the written vote of a three-quarters majority of the votes of all its members decides the countries included in the Association." As a first manifestation of the resumption of activity on the part of the Association, the Executive Committee will recommence shortly the publication of its monthly bulletin. The permanent Commission, which will be convened at an early date, will be called upon, as a primary duty, to declare itself on the subject of the place and date of the ninth session, at which the statutes in their complete form will be discussed by the plenary assembly with a view to its approval.

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MR. GEORGE FRANCIS THURSTON, who has been appointed Secretary of the Great Eastern Railway, entered the service in the Goods Department at Bishopsgate in 1885. He was transferred to the District Goods Manager's Office in 1889 and to the Funds Office in 1890. On the inauguration of the Railway Conciliation Scheme in 1907 he became Secretary of the company's side of the respective Boards. He was appointed Secretary of the Superannuation, Pensions and Accident Funds in 1910 and Staff Assistant to the General Manager in 1917. Mr. Thurston will continue to exercise oversight in regard to labour questions, and will also, for the present, continue to exercise supervision over the Funds Department.

* * *

OWING to indifferent health, Mr. R. J. Patrick, District Goods Manager, Caledonian Railway, has resigned. Mr. Patrick joined the service of the company in 1885, beginning in the Works Manager's Office of the Locomotive Department, from which he passed to the Locomotive Superintendent's Office. Mr. Patrick filled in succession the positions of Parcels Agent for the line, Assistant District Superintendent (unattached), Assistant District Traffic Superintendent for the Northern Section, Parcels and Excursion Agent, Chief Traffic Agent for the company, which included the supervision of the agencies in Scotland, England and Ireland; and latterly he occupied the position of Goods Manager for the Western District.

Elliott] *[& Fry.*

Mr. G. F. THURSTON,
Secretary, Great Eastern Railway.

MR. ANDREW BRAND, late Assistant District Superintendent (unattached), Caledonian Railway, whose death was recently announced, was born at Airth, Stirlingshire, in 1854, and educated at the public school in Airth. He entered the office of James Wilson & Son, Solicitors, Falkirk, with whom he became apprenticed. Later, he joined a legal firm in Dumbarton, and thereafter went to the office of Crawford & Herron, Writers, Glasgow, as managing clerk, during which period he took his Scots Law and Conveyancing Classes at Glasgow University. In 1881 he obtained an appointment in the Solicitor's Department of the Caledonian Railway, but he was not destined to remain there long, as his marked ability in Parliamentary matters secured for him his transference in 1888 to the office of the late Sir James Thompson, then General Manager of the company. Mr. Brand remained in the General Manager's Office until his retirement, under the age limit, at the end of May of this year. From February 1, 1901, until his retirement, Mr. Brand acted as Chief Assistant to the General Manager, with the title of Assistant District Superintendent (unattached). During his service in the General Manager's Department he took a prominent part in all the big Parliamentary fights in connection with the promotion of new railways and docks by the company.

* * *

WE regret to record the death of Lord Rathmore, in his eighty-first year. He was

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raised to the Peerage as the first Baron Rathmore in 1895. From thence onwards his political activities were not so conspicuous, and he devoted increasing attention to railway affairs. He was for many years Chairman of the North London Railway, and had long been a director of the London & North Western Railway. He took an active part in the starting of the Central London Railway, and his foreign railway interests included the presidency of the Council of the Ottoman Railway from Smyrna to Aidin.

* * *

MR. H. G. BURGESS, who has been appointed the principal representative of the Ministry of Transport in Ireland, has served with the London & North Western Railway for the last 40 years. He was in charge of that railway's general business in Scotland for five years, and for 20 years served as General Manager for Ireland, being responsible for the working of all the company's Irish shipping and railway traffic. For the same period he also served as Managing Director of the Dundalk, Newry & Greenore Railway, in which the London & North Western Railway is the principal shareholder. For 16 years he was also a Director of the Dublin & South Eastern Railway, and for four years of that period acted as Deputy-Chairman. For 20 years he was an elected member of the Dublin Port & Docks Board, but resigned when the war imposed special duties in regard to Irish transport. For 10 years he was a member of the Dublin Local Marine Board, and for 18 years a Commissioner for Carlingford Lough. The war period added considerably to Mr. Burgess's responsibilities. He was appointed Director of Irish Transportation, acting on behalf of the Ministry of Shipping and the English and Irish Railway Executive Committees, his duties covering mobilisation, traffic associated with the Army and Navy, and the transport of war material; the regulation of all shipping between Great Britain and Ireland, and the transit of all descriptions of traffic on the railways on both sides of the Channel. He also acted as the Coal Controller's representative in Ireland. It will thus be seen that Mr. Burgess, who is himself an Irishman, is specially qualified to deal with transport matters affecting Ireland, and his new appointment is peculiarly appropriate. Mr. Burgess has resigned the Deputy Chairmanship of the Dublin & South Eastern Railway.

* * *

MR. ARTHUR T. COTTON, who as announced in the September RAILWAY MAGAZINE, has been appointed Irish Traffic Manager for the London & North Western Railway, in succession to Mr. H. G. Burgess, obtained his early railway training on the Belfast & Northern Counties Railway, of which his father was General Manager. He was afterwards transferred to the London & North Western Railway, being attached for a time to the office of the District Superintendent at Liverpool. He then held the position for several years of an Outdoor Assistant to the Superintendent of the Line, attached to headquarters at Euston. In 1889 he was appointed Assistant Traffic Superintendent at Abergavenny for the South Wales Division. From 1895 to the beginning of 1916, Mr. Cotton represented the Lancashire & Yorkshire and the London & North Western Railways in Belfast and the North of Ireland, in connection with the Belfast and Fleetwood steamers, but early in 1916 he returned to the South Wales Division as District Traffic Superintendent at Abergavenny, holding this position until the end of July last, when he took over the duties of Irish Traffic Manager to the company, with headquarters at North Wall, Dublin.

Press] [*Photo Agency.*

Mr. ARTHUR T. COTTON,
Irish Traffic Manager,
London & North Western Railway.

* * *

MAJOR THORNHILL, of Crewe, who commanded a company of the Railway Operating Division, R.E., in Palestine and Egypt, has been appointed to succeed Mr. H. F. Perkins as Divisional Engineer of the

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Chester-Holyhead section of the London & North Western Railway, stationed at Bangor.

* * *

SIR WILLIAM H. BEVERIDGE has been appointed Director of the London School of Economics, in succession to Dr. W. Pember Reeves, as from October 1, 1919. He is at present Chief Permanent Official of the Ministry of Food.

* * *

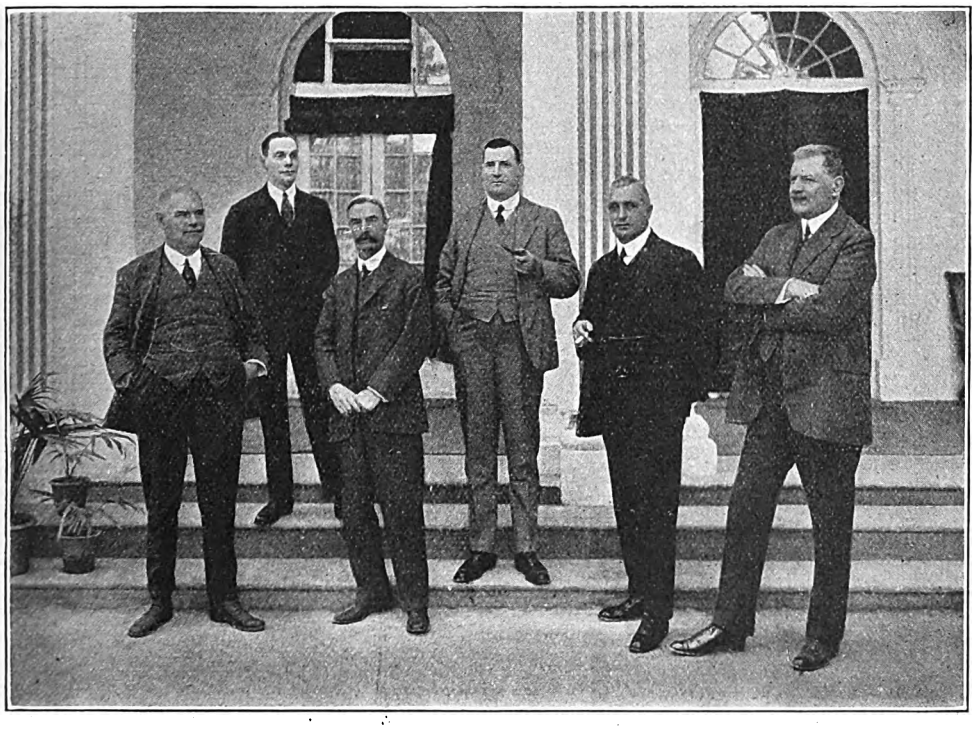
ANYONE seeking an artistic etching or lithograph by an eminent artist would hardly think of looking in such a prosaic place as a railway company's office or in a window usually devoted to steamer models and Canadian apples. The Canadian War Records, being desirous of bringing before the notice of the man in the street the collection of pictures of which they have to dispose, obtained the permission of the Canadian Pacific Railway to convert their Charing Cross office window into a picture gallery for the display of signed etchings, dry points and lithographs by such eminent artists as Frank Brangwyn, A.R.A., Richard Jack, A.R.A., Edgar Bundy, A.R.A., Lieuts. C. H. Barraud and G. De Witt, and Caroline H. Armington. The subjects of the pictures include the "Landing of the First Canadian Contingent," "The Battle of Vimy Ridge," "The Cloth Hall, Ypres," "Arras," "Mont St. Eloy," "Cambrai," "Mont des Cats," and many other places that were of vital interest during the war. All these pictures are to be disposed of on behalf of the Canadian War Memorial Fund.

* * *

IN connection with the Athens Exhibition, a clear summary of the existing travel facilities overland from London to Mediterranean ports and thence by fast steamers to Piraeus (port of Athens) has been produced by the London offices of the Italian State Railways. It shows that one can travel first-class throughout for £29 10s. (including sleeping car) and £16 10s. second-class.

* * *

DISTINCT encouragement has always been given by the London Underground Railways to the staff at those stations where it is possible to cultivate gardens to do so. There



MEMBERS OF THE INDIAN STANDARDISATION OF GOODS WAGONS COMMITTEE.

Reading from left to right:—A. M. Bell, O.B.E., M.I.Mech.E. (G.I.P.R.); C. R. S. Farmer, A.M.I.C.E. (B N.R.), Secretary; F. H. Addis, O.B.E., A.M.I.C.E., F.R.S.A., V.D. (B.B. & C.I.R.); W. F. Gibbons, M.I.Mech.E. (B.N.R.), Chairman; S. J. Kendrick, O.B.E. (E.I.R.): W. F. Harnett, C.B.E., M.I.Mech.E., V. D. (E.B.R.).

This Committee commenced sitting January 2, 1919

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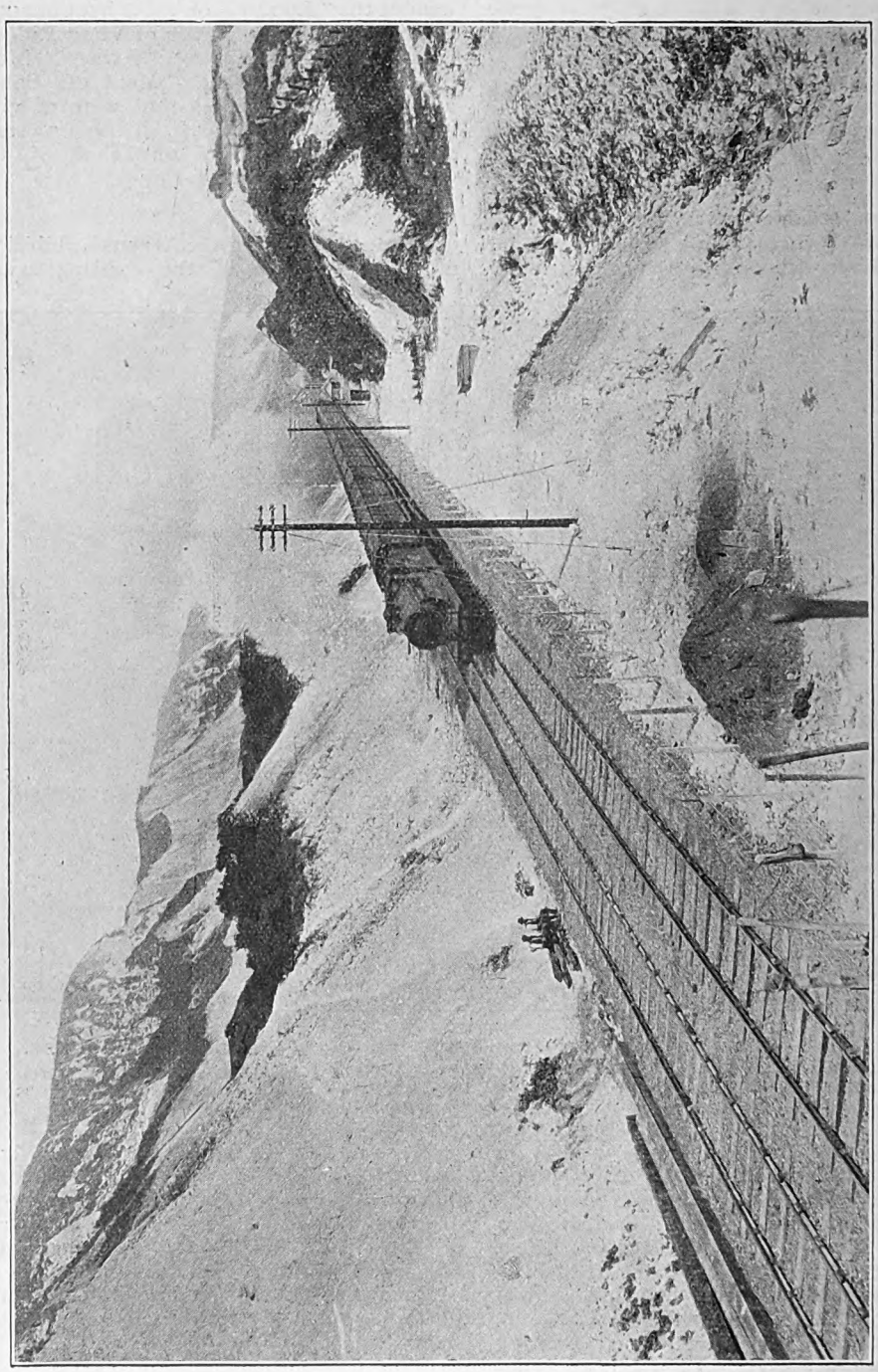

FOLKESTONE—DOVER LINE RE-OPENED: SOUTH EASTERN AND CHATHAM RAILWAY.

After being closed since December, 1915, this section was cleared and public traffic resumed August 11th, 1919.

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is no doubt the public appreciate this policy and that the staff take a keen interest in the movement. Following the annual inspection of the station gardens on the Metropolitan District Railway, prizes totaling £28 10s. have been awarded, the two first prizes of £3 each being secured by Northfields and Boston Manor respectively.

* * *

A VERY attractive syllabus for the winter season has been issued by the transport section of the London School of Economics. The inaugural lecture will be given by Mr. Wm. Acworth on Thursday, October 2, at 6.15 p.m. The chair is to be taken by the Right Hon. Sir Eric Geddes, M.P., Minister of Transport. The lecture will be open to the public without fee. RAILWAY MAGAZINE readers resident in and around London who are able to attend the lectures arranged by the Committee are strongly recommended to obtain a copy of the programme and particulars of fees from the Secretary. The London School is situated at Clare Market, quite close to the Strand.

* * *

IT is pleasing to record a movement in the direction of staff welfare work that has been inaugurated by Mr. L. Speakman, General Manager, on the Furness Railway. About three months ago a boys' club was started in connection with the Engineering and Locomotive Department Works. The company provided a room and fitted it up as a gymnasium. This is open most nights of the week and is made use of by between 60 and 80 boys, who show their appreciation by regular attendance. The club is supervised by adult members of the staff, and instruction is given in gymnastics, boxing, ambulance, physical drill, seamanship, signalling, swimming, &c., by qualified instructors, who all give their services voluntarily. In connection with the club there is a Troop of Sea Scouts, and all boys between the ages of 15 and 18 are encouraged to join. Members of the club are chiefly apprentices, engine cleaners, office boys, &c., between the ages of 15 and 21. It is noticeable that the institution of the club is having a beneficial effect on the boys and is providing excellent and instructive recreation and employment for them in their spare hours.

* * *

AT the Shipping, Engineering and Machinery Exhibition, Olympia, which is open until October 17, there is much to interest RAILWAY MAGAZINE readers. Prominent among the exhibitors are C. C. Wakefield & Co., Limited, patentees and makers of mechanical appliances, and well-known throughout the railway world by reason of the great success of the Wakefield mechanical lubricator. One of the most interesting stands is occupied by our contemporary, *Shipbuilding and Shipping Record*, a journal dealing with marine engineering, docks and harbours, as well as shipping, and therefore closely allied to the railway industry, as British railways are in turn dock, harbour and ship owners on a very large scale.

* * *

ONE of the foremost firms in supplying war material was that of Sir W. G. Armstrong, Whitworth & Co., Limited, and now, on reverting to the manufacturing necessary to secure the fruits of victory and peace, there has been produced an admirably illustrated book setting forth the activities of the firm in war-time. During the period of hostilities the firm supplied more than one-third of the national output of guns, in addition to vast quantities of other war material. The book for the first time reveals to the general public the magnitude of the task which was undertaken by the firm and the extent to which these efforts assisted in the ultimate victory over the Central Empires. Among the numerous well-executed illustrations may be mentioned one depicting tanks on a railway train on their way to the Western Front and another of a heavy main line locomotive built at the Scotswood works of Sir W. G. Armstrong, Whitworth & Co., Limited. Equally striking are views of the cross-Channel train ferry immediately after launching and of the deck of the ferry.

* * *

"REALLY excellent" was the verdict bestowed at the September general meeting of the members of the Railway Club, 92, Victoria Street, S.W., on the reading of a paper by the Rev. A. Cunningham Burley, his theme being "The Surrey Iron Railway." Mr. W. Parker presided, and announced that by reason of the great interest demonstrated, Mr. Burley had consented to conduct a party over the route of the railway on Saturday afternoon, October 25. Members will meet at 2.30 p.m., at Railway Wharf, York Road, near High Street, Wandsworth. The nearest railway station is Wandsworth, and tramcars from Vauxhall to Tooting pass the wharf. At the October general meeting at headquarters on Tuesday evening, October 14, Mr. Chas. Travis, the well-known railway writer and contributor to THE RAILWAY MAGAZINE, is to present a paper on a popular subject.

* * *

AN application for light railway powers has recently been made by the Essex Light Railways Syndicate to incorporate the Ongar and Shenfield Light Railway Company,

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and to authorise the construction of a line from Chipping Ongar to Shenfield, in Essex. The proposed line is to commence at Chipping Ongar at a point immediately to the north of the Great Eastern Railway station, and to run thence to that company's Southend line, a junction being proposed therewith a short distance to the eastwards of the point of connection between the Southend line and the Great Eastern main line between London and Colchester. Additionally, a spur off the proposed line is to run alongside the Great Eastern main line to Shenfield Station, no junction, however, being proposed at this place. The length of line is slightly over 8¼ miles. The scheme provides for single line throughout on the standard gauge.

* * *

WITH commendable enterprise the Metropolitan Railway has issued a further edition of their now well-known publication, "Metro-land," and to those who have yet to discover the charming rural districts that abound in Hertfordshire and Buckinghamshire this book will specially commend itself. "Metro-land," replete with information, illustrations and advice, leads the stranger through scenes of sylvan beauty which, although almost touching London, still remain unaltered since they awakened the poetic fervour of Oliver Goldsmith. It further deals with the novel departure of the Metropolitan Railway Country Estates, Limited, in acquiring several large freehold estates, which they are laying out with roads and cutting into plots to suit purchasers, thereby helping to solve the perplexing housing problem of the present day.

* * *

IT is with pleasure that we record a renewal of activity on the part of the International Railway Congress Association. A recent communication addressed to the various railway administrations which are parties to the Association appears to indicate a complete resumption of activities. This communication from the Permanent Commission, which is signed by the President (V. Tondelier) and General Secretary (L. Weissenbruch), informs the adherents that, in pursuance of a decree dated November 10, 1918, the Association has been compelled to dissolve and go into liquidation, in order that "enemy interests" might be sequestrated, and observes that the Permanent Commission propose to re-constitute the Association "on precisely the same basis as before," subject to the following addition to Art. 3 of the Constitutions:—"The Permanent Commission, by the written vote of a three-quarters majority of the votes of all its members, shall decide the countries to be included in the Association." An intimation is also given that publication of the valuable bulletin will very shortly be resumed and that steps are being taken to convene an early meeting of the Permanent Commission, in order to decide the place and date of the next session.

* * *

SEVERAL schemes for the improvement of communications in Scotland are recommended in the report issued by the Scottish Rural Transport Committee. Their proposals aim at the opening up of large areas of country, chiefly in the Highlands, which for the most part are unprovided with railways or other effective means of transport, and the development there of agriculture and other rural industries. The Committee state that lack of transport facilities greatly restricts agricultural production, fishing, and forestry, and that for the same reason mineral deposits are left unworked. Proposed schemes comprise:—1. Standard and light railways (17 lines, of a total length of 382 miles). 2. New roads and improvement of existing roads. 3. New steamer and motor boat service. The Committee recommend the establishment of a Scottish Department of Ways and Communications, whose functions would include such a control of railways as would ensure that the extensions proposed should be constructed, worked, and maintained efficiently.

* * *

THE Queensland Acting Minister for Railways has been inspecting the Burnett district of Queensland in connection with a scheme of railways for opening lands to settlement by soldiers. It is proposed to construct four spur lines in conjunction with the proposed Many Peaks to New Cannindah line, including junctions with the line at Mundubbera and the Dawson Valley line. The area of land to be developed is 2,500,000 acres, and it is estimated that it will provide land for 15,800 settlers. The estimated cost of the railways is £1,420,000, while provision will have to be made for roads and water supply.

* * *

FROM 45, Pine Street, Sydney, Australia, on behalf of himself and Mr. William Stewart, 44, Eden Vale Road, Mount Eden, Auckland, New Zealand, Mr. Charles F. Dewey writes:—It is the intention of Mr. Stewart (who is also a reader and correspondent of THE RAILWAY MAGAZINE) and myself, together with a few other friends in Canada and United States of America, to try and form a mutual association for the interchange of locomotive, railway, &c., topics

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and photographs. Mr. Stewart and I both understand thoroughly locomotive and train working, &c., and, being well connected with our respective railway departments, are in a position to secure at all times reliable authoritative information and photographs relating to any branch of the services. As we are not too well known in the Old Country, have you space in your valuable periodical to make a note to this effect on our behalf. Any reader who may be interested could write either of us. Of course, we would also like those who may care to become members to have a fair knowledge of railway operation in order to be able to understand technicalities.

* * *

We understand that the Great Southern and Western Railway of Ireland is building at Inchnore Works three more 4-cylinder 4-6-0 superheater locomotives of the "400" series, designed by Mr. E. A. Watson. the Locomotive Carriage and Wagon Superintendent, and to be numbered 401, 402 and 403. They will probably be in service before the end of the present year. Nos. 331 and 332, 4-4-0 express engines, have been rebuilt with 1⅛-in. frames, and extended smoke-boxes. All the engines of the Great Southern and Western Railway are, as a temporary measure, being painted grey.

In sending photograph of Erie Railroad 4–6–0 engine No. 970, Mr. C. B. Chaney, of Brooklyn, N.Y., remarks:—As your readers may know, the Erie Railroad has for a number of years had an honorary order, known as the "Order of the Red Spot," to which only enginemen having very good service records are eligible. The conditions of membership cover punctuality of the train, freedom from engine failures and detentions, cleanliness of engine, &c., and an engineman who becomes a member of the "Red Spot" is entitled to have the front number plate on the smokebox of his engine painted red background. For further meritorious service the engineman's name is painted in gold letters on the side of the cab. Erie engine No. 970 is known as the dean of the "Red Spots," and noted as one of the handsomest engines in America, and has been a "Red Spot" for about nine years. The engine driver is Mr. Harvey Springstead, and his name adorns the engine. Engine No. 970 was built in 1904 by the Baldwin Locomotive Works in Philadelphia, Pa., has 19 in. by 26 in. cylinders, 68 in. driving wheels, boiler 64 in. in diameter, carries 200 lb. of steam, and weighs 176,400 lb. Since it was built, outside valve gear has been added, also piston valves, superheater, electric headlight, &c., all of which are shown in the photograph, which was taken in July, 1919,

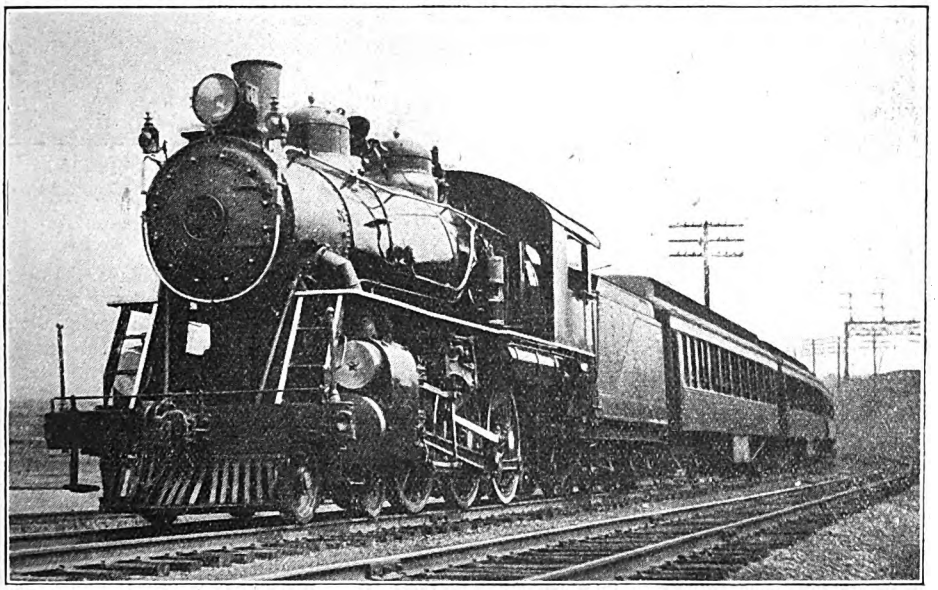

Photo.] ERIE RAILROAD. [*C. B. Chaney.*

Suburban train from New York (Jersey City). 4-6-0 engine, No. 970, "Harvey Springstead.

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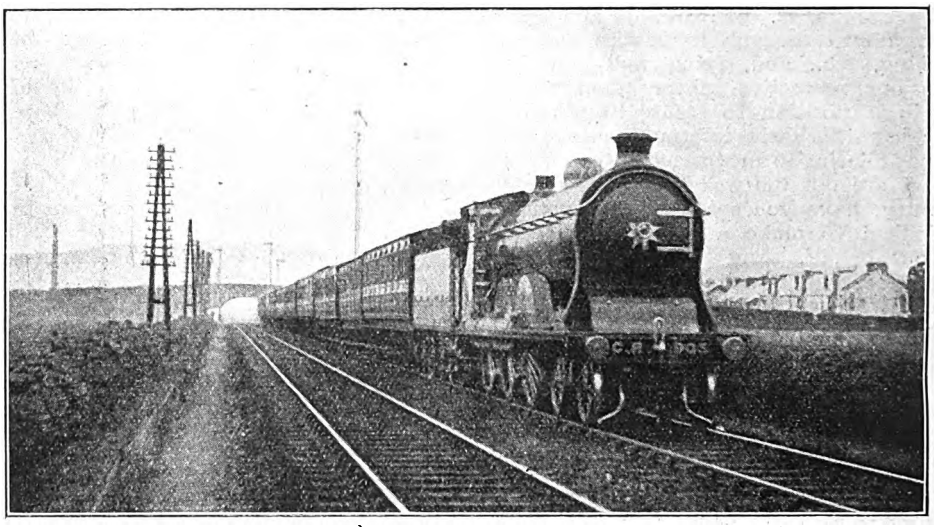

Photo.] CALEDONIAN RAILWAY. [*K. A. C. R. Nunn.*

Glasgow—Aberdeen express near Perth. 4-6-0 engine, No. 905.

when the train was running about 30 miles per hour.

* * *

SOME misapprehension appears to have arisen in regard to the numbers which we gave in our August issue, page 148, of the 2-8-0 R.O.D. engines taken over by the London and North Western Railway, which several readers have pointed out are already numbers of modern engines on that railway. The five numbers mentioned were, however, those held by the engines concerned while on war service. We are indebted to Mr. C. Williams, of Crewe, for a list of the engines thus taken over, with their previous R.O.D. numbers :—

R.O.D. No.	L.N.W. No.	R.O.D. No.	L.N.W. No.
1633	1620	2038	1422
1642	635	2039	1478
2021	686	2088	1535
2022	56	2089	1542
2023	812	2090	1549
2033	67	2091	1557
2034	1341	2092	1694
2035	1325	2093	1726
2036	1355	2138	1741
2037	1408	2143	969

Of these nine are stationed at Crewe South, four at Warrington, four at Preston, and three at Carlisle—total twenty.

* * *

A CORRESPONDENT writes :—*The Great Bear* celebrated "Peace Day," July 19th, by acting as pilot to her own train. She was attached to the 5.30 a.m. *ex* Paddington, due at Bristol at 8.31. The train engine was one of the "Flower" class. The load consisted of 12 bogie vehicles; and, therefore, was well within the powers of either of the locomotives. Appearances suggested that the arrangement was designed to avoid "light engine" working, and that it was deemed expedient to give precedence to the heavier locomotive, in accordance with the piloting practice generally observed on the Great Central Railway. Certainly engine failure was not responsible, for *The Great Bear*, in accordance with normal working, returned with the 9.40 a.m. *ex* Bristol.

* * *

AN evident parallel to this method of working is frequently to be witnessed on the Midland Railway in the case of the 3.55 p.m. from Bath to Bristol. This train is frequently hauled by two engines—a rebuilt 4-4-0 *Belpaire* as pilot, with a 0-4-4 T as train engine. In this case, the practice is adopted to "balance" engine-working, and the train concerned is particularly light. The heavier engine acts as pilot from considerations of safety in running, as presumably was the case with *The Great Bear*.

* * *

MR. C. HUDDLESTON kindly communicates :—It may interest RAILWAY MAGAZINE readers to know that among the latest Stirling 4–4–0 engines on the South Eastern & Chatham Railway to be rebuilt with extended smokeboxes are the following: Nos. 2, 32, 53, 118, 137, 148, 183, 199, 216, 240, 447 and 450. Stirling 4–4–0 engine No. 34 has been equipped with

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"top feed" apparatus, delivering the water between the safety valves and the chimney. Large superheater 4–4–0 engine No. 760, formerly at Cannon Street, is now at Ashford (No. 6) shed.

* * *

FROM a RAILWAY MAGAZINE reader in the Scottish Highlands comes the following:—The two new 4–4–0 Highland Railway passenger locomotives *Snaigdw* and *Durn* work regularly on passenger trains north of Inverness. Usually they are unpiloted. Also *Ben Mholach*, No. 63, and *Ben Bhreac Mhor*, No. 60, work on up and down mail trains, the one taking the up train one day and returning with the down train the next day. They are often piloted by a smaller 4–4–0 engine, No. 6, *Ben Armin*, and No. 7, *Ben Wyvis*, and No. 41, *Ben Brach Ard*, are the most common. The latter engine and the old "Strath" class 4–4–0 *Strathspey* are often to be seen working together on goods trains. The "Castle" class do not seem to be employed on passenger trains on this section any more, but in 1914 *Taymouth Castle* and *Murthly Castle* worked on the mail trains. The North British Railway 0–6–0 goods engine No. 672 works every day over this section, and Caledonian Railway 4–6–0's with small driving wheels also are to be seen.

* * *

MR. W. D. M. STEPHEN sends from Inverkeithing some information as to recent locomotive developments on the North British Railway. The latest "Atlantic" to be re-built with "Robinson" superheater and 21 in. by 28 in. cylinder is No. 870 *Bon Accord*. New 4-4-0 "Glen" class engines have been built at Cowlairs this year, their dimensions being similar to previous engines of the same class. Their numbers and names are as follows:—No. 242, *Glen Marnie*; No. 270, *Glen Garry*; No. 278, *Glen Lyon*; No. 287, *Glen Gyle*. No 270 is at present at work on the Edinburgh portion of the Fife-shire Coast Express, while No. 278 works the Glasgow portion of the same train, and No. 287 works the Lothian Coast Express from Glasgow to North Berwick. A 0-6-0 "Holmes" goods engine re-built by Mr. Reid in 1915 with square cab and a larger boiler has received the name *Ole Bill*. Its number is 661. No. 608 (re-built 1914) has been named *Foch*. Several engines of the last-mentioned class are to be seen awaiting overhaul at Cowlairs, which have returned from overseas. Nos. 36, 37 and 633—642 inclusive, of the "Holmes" 4-4-0, 6 ft. 6 in. class, built at Cowlairs in 1886, have been re-built with larger boilers and new cabs with side windows, similar to those re-built in 1911. Owing to passenger engines having to work goods trains from time to time, and to facilitate the working of the control system, they are having their number painted in large gilt letters between the initials N.B. on the tender. Small cast-iron plates bearing letters indicating the load classification are being fitted above the number plates of all engines; these classification letters were given in volume XLIII of the RAILWAY MAGAZINE, page 142.

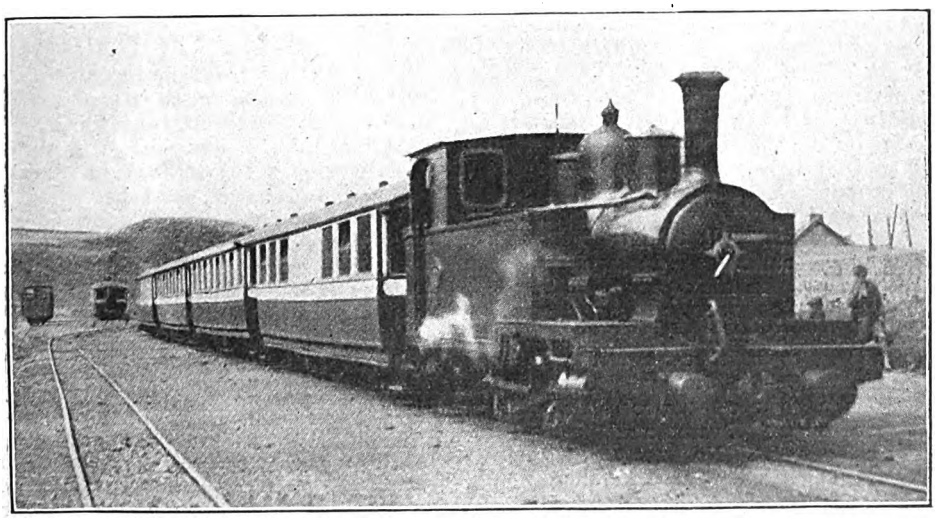

Photo.] CAMPBELTOWN & MACHRIHANISH LIGHT RAILWAY. [*E. A. Gurney-Smith.*

Train at Machrihanish.

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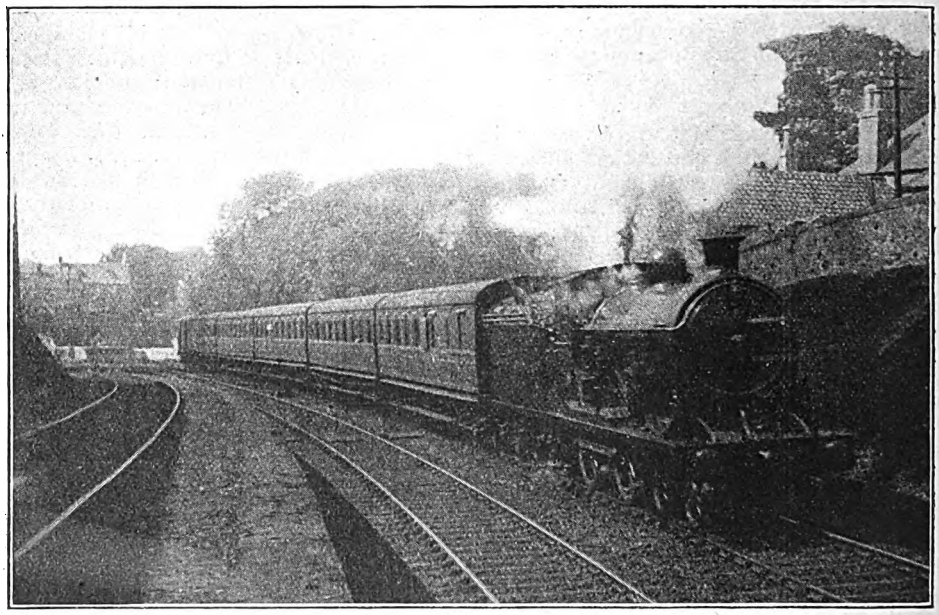

Photo.] NORTH BRITISH RAILWAY. [*G. M. Shoults.*

Edinburgh—Dundee train leaving Aberdour. 4–4–0 engine, No. 898, "Sir Walter Scott."

FURTHER to the paragraph on page 149, August RAILWAY MAGAZINE, and supplementary to the information given by Mr. Stephen, Mr. A. G. Zamorski, writing from Kirkintilloch concerning North British Railway locomotives, remarks: "No. 695, a 5-ft. 7-in. 4-4-0, has been rebuilt with Robinson superheater. Nos. 37, 633, 634, 635, 637, 639 and 642 are 4-4-0s. with 6-ft. 6-in. wheels rebuilt with large boilers and not superheated. The new 'Glen' engines are: Nos. 242 *Glen Marnie*, 270 *Glen Garry*, 278 *Glen Lyon*, 281 *Glen Murn*, and 287 *Glen Gyle*. No. 278 is working on the Fife Coast Express, between Crail and Glasgow. No. 287 is working on the Lothian Coast Express, between North Berwick and Glasgow. Others mostly work to Fort William. All belong to Eastfield shed. The locomotives damaged by the recent fire at Eastfield are Reid's 4-4-0 'Glen' type, Nos. 100, 405; Intermediate, No. 332; Superheater 0-6-0, Nos. 431, 465, 466; 18½-in. cylinder 0-6-0, Nos. 38, 185, 330; Holmes' 4-4-0, Nos. 215, 600; 0-6-0, Nos. 21, 169, 744; 0-4-0, dock saddle tanks, Nos. 310, 1096; Drummond's 0-6-0, No. 535; 0-6-0 tank, No. 107; Wheatley's 0-6-0 saddle tank, No. 1235 (originally 255). Most of them have now been removed to Cowlairs shops for repairs.

FROM Old Aberdeen, Mr. D. L. Thomson writes:—"With regard to Mr. Zamorski's query on page 149 of the August, 1919, RAILWAY MAGAZINE the C.R. 0-4-2 tanks, now 1262 and 1263, are at Airdrie shed, and work to a brick factory near Glenboig. The 2-4-2 T is 1153. The works numbers of the new N.B. goods engines are 21925-55."

* * *

SOME further Scottish locomotive news, for which we are indebted to Mr. D. L. Thomson, of Aberdeen, is to the effect that the Caledonian Railway has completed the series 300–323 of new non-superheated 0-6-0 goods engines, and has now added Nos. 294–299 inclusive, making 30 engines in all. 4-4-0 engines Nos. 140 and 925 have been rebuilt this year without superheaters. Locomotives returning from overseas use to this railway are being placed on the duplicate list by the addition of 1,000 to their numbers. The newly superheated North British Railway "Atlantic" *Bon Accord*, No. 870, is one of the first North British passenger engines to have the number painted in large figures on the tender sides; the class letter "H" is also carried on a small plate above the number-plate.

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Frontispiece : G.W.R. Engine Cab Interior.
The Nine Days Railway Strike.
Tottenham and Hampstead Junction Railway.

THE Railway Magazine

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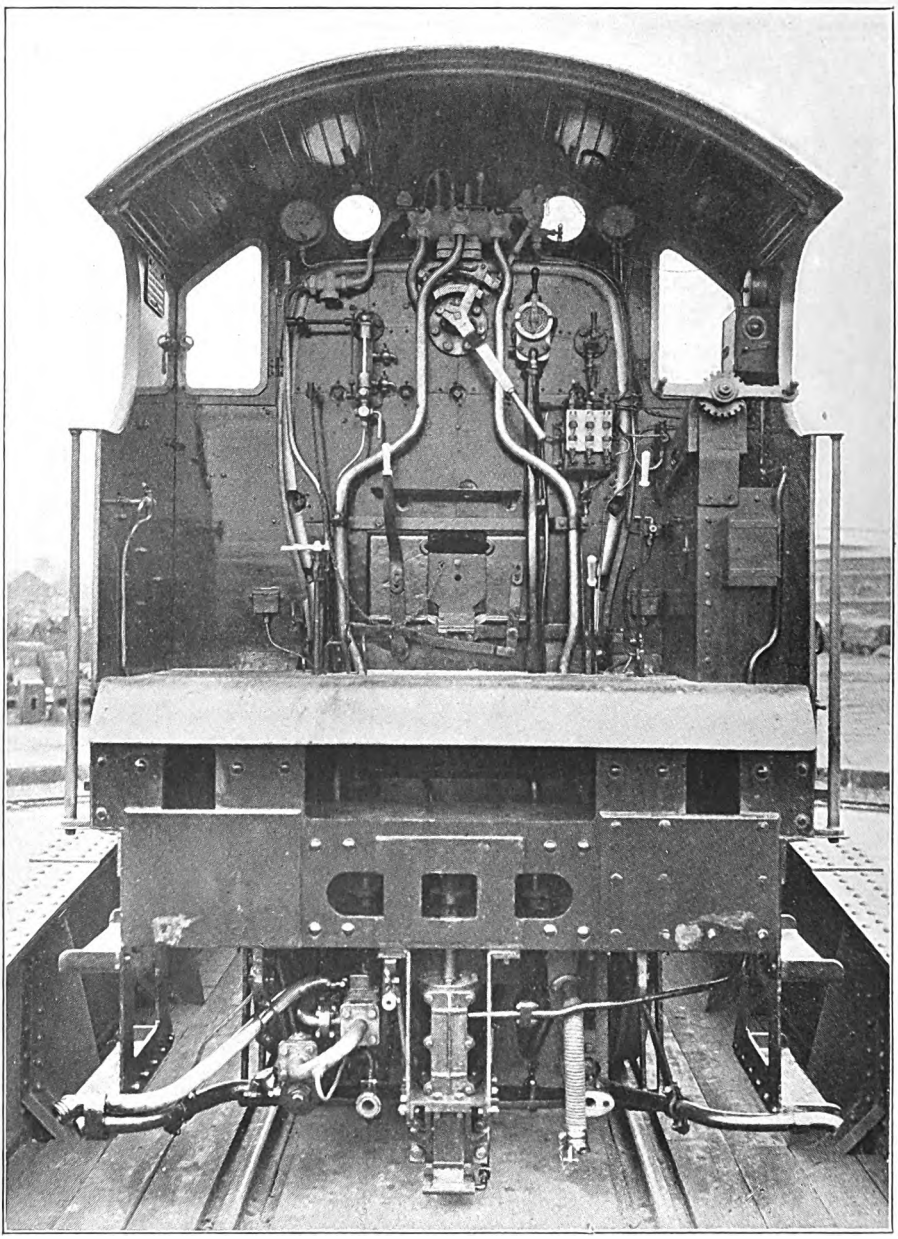

THE RAILWAY MAGAZINE.

GREAT WESTERN RAILWAY LOCOMOTIVE FIREBOX FRONT AND FOOTPLATE.

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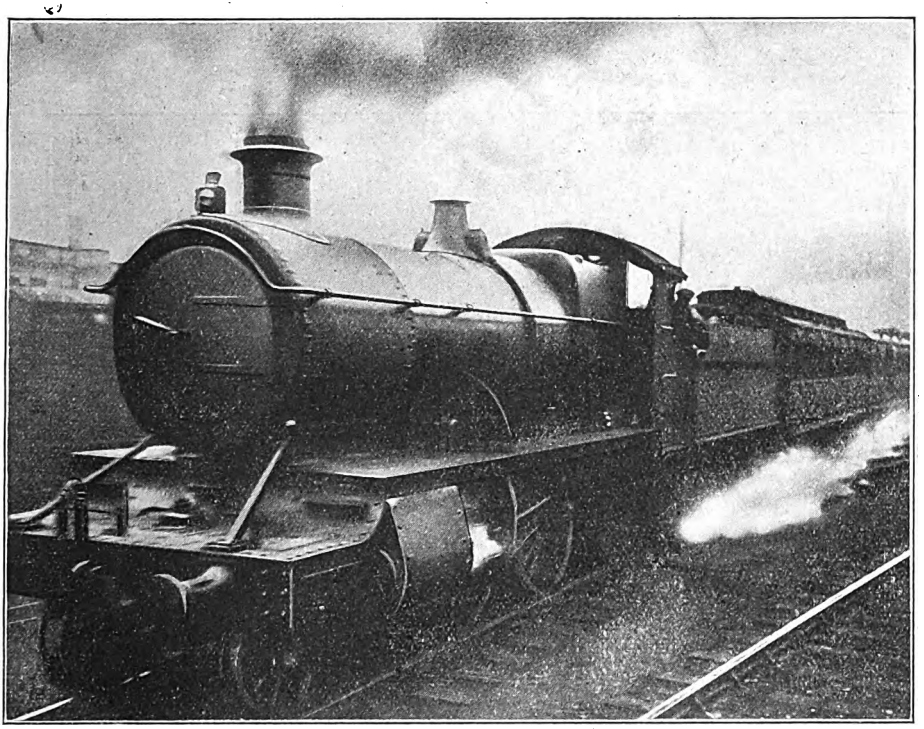

LEAVING PADDINGTON WITH THE 2.45 P.M. FOR SLOUGH.

My Experiences as a Volunteer Engineman on the Great Western Railway during the Great Strike.

By CHAS. S. LAKE, A.M.I.Mech.E.

READERS of the RAILWAY MAGAZINE will not need to be reminded that, on the night of Friday, September 26, the leaders of the National Union of Railwaymen, or, to give it its more familiar title, the N.U.R. declared a general strike of its members throughout the country, and that the Associated Society of Locomotive Engineers and Firemen, although having no grievance at all, brought out the enginemen in support of the others.

The immediate result was, as anticipated, to render the British railway system practically inoperative, and the strikers, or rather their leaders, began to talk loudly about "starving" the Government, by which they meant the community, into "submission" within a week. In this, however, they had reckoned without their host, as, in accordance with a preconcerted plan, the Government at once put into execution a comprehensive arrangement for the distribution of food and other essential commodities by road motor transport. The roads were soon alive with convoys of lorries, steam wagons and other vehicles, whilst motor-bus services were organised, wherever possible, in country districts for the conveyance of passengers; the London trams, 'buses and taxicabs continuing to

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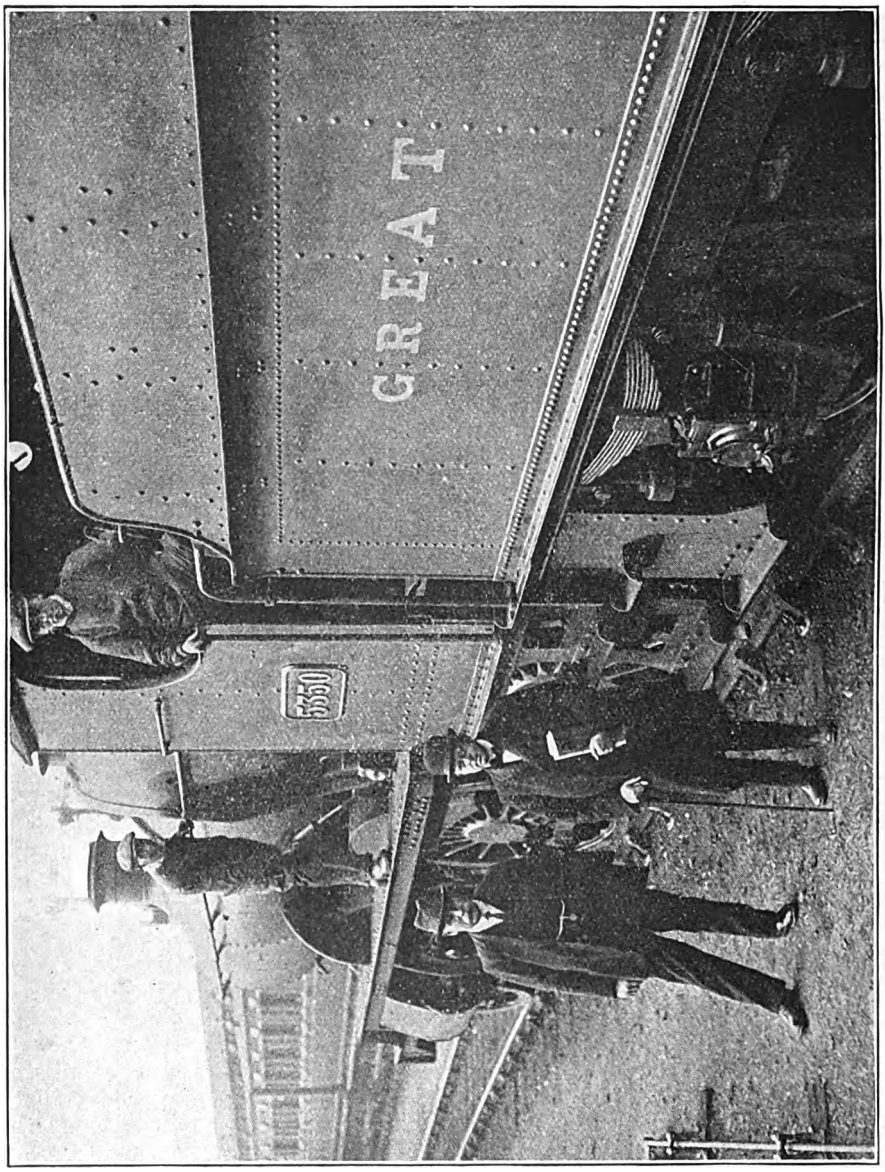

[*Topical.*

Photo.]

VOLUNTEERS R. H. WHITLOCK AND CHARLES S. LAKE ON GREAT WESTERN RAILWAY ENGINE No. 5350.

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run as usual. The railway services, even at this critical juncture, never entirely ceased, and day by day, if not hour by hour, improved services were organised by the various companies with the assistance of those of their servants who remained loyal, supplemented by an ever increasing body of volunteer helpers from outside. It will always stand to the credit of the British railway authorities that in the most difficult circumstances with which they had ever been faced, they acted with the greatest energy and foresight; and although, as a matter of course, the train services were at the best far from normal, before many days had passed certain of the local and intermediate ones had, in a large number of cases, assumed a condition which approximated very nearly, indeed, to the essential requirements of the public.

The strike, occurring as it did at midnight on the Friday, caused less inconvenience than would have been the case had the day selected been one earlier in the week. People were more or less content to remain at home on the Saturday (a half-day at the most), and all hoped matters would have righted themselves by the Monday morning, when the real tussle so far as the public was concerned would begin. Monday morning, however, brought no relief, and those living any distance from their work found themselves in difficulties with regard to means of transport.

Many and various were the expedients resorted to in the endeavour to get to business. Those possessing motor cars or motor cycles were deemed fortunate, but the advantage they possessed was nullified to some extent by the Government placing a virtual embargo on the sale of petrol, the available stocks being for the most part earmarked for national needs.

Enrolling as a Volunteer.

The present article, representing as it does a personal narrative, is continued from this point in the first person. On Saturday, September 27, I found myself in possession of only sufficient spirit to enable me to motor from Bedford, where I live, to London and back one journey each way—but, by dint of canvassing among friends who were not compelled to use their cars in connection with their work, I managed to secure a couple of extra cans. I set forth on the Monday morning *en route* for Westminster and duly arrived there, picking up a City man, a director of a public company, on the way and conveying him to London. My intention up to then had been, if possible, to obtain quarters in town for the night and return home the next day. This, however, was not to be. Mr. J. A. Kay, Managing-Director of *The Railway Gazette*, *The Railway Magazine* and other journals, met me and said he had been asked if any of his staff would like to volunteer for railway work for which they were qualified. Needless to say I jumped at the opportunity. He then at once accompanied me to Paddington for the purpose of offering my services to the Great Western Railway Company as a driver or fireman. Mr. Kay was instrumental in securing me immediate interviews, including one with Mr. Nicholls, the Superintendent of the Line, with the result that after a short conversation with Mr. C. Crump, the London Divisional Locomotive Superintendent, I was invited to proceed to Old Oak Common Locomotive Depôt for the purpose of being tested as to my knowledge of locomotive handling. This ending satisfactorily I was duly taken on, as a fireman at first, and asked to book on at 11 a.m. the next day.

My first trip was with a train leaving Paddington at 2.45 p.m. for Slough, instructions being given me to relieve the fireman who had been doing the morning trips on engine No. 5330, one of the 2–6–0 type locomotives with outside cylinders. The system of train working was as follows:—A specially organised service was run as between Paddington and Southall, Paddington–Slough and Paddington–Reading, the trains in the first two cases being run at almost half-hourly intervals during the busier portions of the day. The Reading trains were for the most part worked by 4–4–2 type tank engines, and the others by 2–6–0 type tender engines, running tender first on the return trips.

The engine working the 2.45 p.m. down train returned with the 4.45 p.m. from Slough, due at Paddington at 5.45 p.m. This was, at that time, the last train up, it being deemed inadvisable by the authorities to run trains after dark, owing to the temper of the strikers and the possibility

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of their resorting to acts of violence on the railway. Happily nothing of the kind occurred, and after a day or two the service was extended, so that the last train up from Slough did not leave until 7 p.m., whilst more, and later, trains were being arranged for by the time the strike was settled.

Experience as a Fireman.

My past experience, gained whilst serving my time as a pupil in the locomotive department of a British railway, now served me in good stead, as also did the experience accumulated whilst travelling on the footplates of modern locomotives of various types on many different lines for the purpose of obtaining data for articles in *The Railway Gazette* and *The Railway Magazine*, the necessary permits being at all times kindly provided by the respective Chief Mechanical Engineers of the railways concerned.

I found the Great Western Railway 2–6–0 type locomotive an excellent one to manage both as fireman and, afterwards, as driver. The "all stations to Slough" type of train with heavy loadings making the journey in one hour, with, as a rule, a special stop at Old Oak Common box, is not the easiest class of work, but the task presented nothing in the way of real difficulty. The engines in question have somewhat shallow fireboxes, and, if steam is kept at about 180 lb. pressure, they seem capable of anything that can be asked of them. The pressure frequently fell temporarily below this figure, but at no time was there any shortage or difficulty in keeping the cylinders well supplied. I found that a bright, even fire, maintained on the principle of "one in each corner and one under the door," with an occasional shovelful spread over the centre, kept the needle pointing in the direction required, and it was seldom necessary to use the pricker to stir or break up the fire. It was my privilege whilst firing to work at different times with two excellent fellows, *i.e.*, Driver Wainwright, a company's man who remained loyal, "having views of his own and preferring to do his own thinking where his employment was concerned," and a volunteer driver, Mr. R. A. Whitlock, who after several years' experience as a locomotive man on the Great Western Railway had forsaken railway service for private trading, but who in the national emergency at once offered his services and was duly appointed to take charge of an engine.

Off-Duty Anecdotes.

Serious as the strike and its consequences, both actual and probable were, there was a humorous side to the business, and several incidents came within my experience which may be deemed worthy of recital.

The company, with due regard to the comfort of those working for them, provided sleeping accommodation and food at Old Oak Common, the former consisting of a number of coaches to which a small tank engine was coupled for heating purposes throughout the train. Those desirous of availing themselves of this accommodation had to apply at one of the offices for blankets and pillows, and they were then allotted a "number," the door of each compartment having chalked upon it numerals from 1 upwards.

Various inscriptions appeared from time to time on the outside of the coaches, such as "Hotel de Luxe," "Home from Home," "The Volunteers' Retreat," and so on, these being chalked on in bold characters as befitted the occasion. My first night on board was spent in "No. 17," to which I was allotted by one of the Loco. Inspectors on night duty. Retiring at about 10.30 p.m., I was still vainly wooing slumber when, an hour later, the door was suddenly flung open and my right to that particular berth challenged from without by a burly engineman, who informed me at the same time that it was freezing like ——, a most inapt comparison it seemed to me, and he wanted to turn in. In vain did I protest that the Inspector had personally conducted me to my sleeping quarters and that I had enjoyed uninterrupted occupation for an hour or more past. I was given to understand in effect that I was an interloper and that the other "bed," *i.e.*, the opposite seat, had been reserved for "my mate" earlier on. Matters had arrived at what appeared to be an impasse when, fortunately for me, the self-same Inspector happened to come along and on inquiring was informed of the position of affairs. I had already begun to make preparation for transferring myself and my belongings to another berth, but the Inspector invited the claimant to my present quarters to follow

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him, and, as they retreated, I heard the latter volubly protesting against what he appeared to regard as an unwarrantable usurpation of his rights.

Later (and I believe at about 1 a.m.) a grimy hand was thrust in through the open window, and on its withdrawal the pillow on the opposite seat disappeared with it. The sequel to this came later when (at about 2 a.m.) the door was again thrown rudely open and in climbed an individual who, after inquiring if this was No. 17, announced himself as George Somebody or other's mate and asked where the said George had taken himself off to. Then, on discovering the fact that the pillow was missing, he launched forth into a torrent of invective against the person or persons unknown who had purloined the article, demanding in a very loud tone to know who the &c., &c., &c., had "pinched" his something or other pillow and what the devil they thought they were doing. In reply, somewhat wearily I am afraid, I told the irate driver that I was totally unacquainted with the identity of the person whose arm an hour or so previously had stolen into the compartment and had disappeared with the pillow into the outer darkness. At the same time, whilst admitting the forcibleness of his remarks and their aptitude, in a measure, to the circumstances, I asked "George Somebody or other's mate" to be good enough to refrain from further observations (in the absence of the delinquent), as I had only some three hours left before being due to turn out at 5 a.m. With an "orl rite matey, I shall be snoring in abaht five minutes," he turned in and, as good as his word, was, in less than the stipulated time, awakening the echoes by means of the loudest snores it has ever been my unfortunate lot to hear. For the time being his sonorous efforts put an end to my endeavours to get to sleep, but I must eventually have dozed off, for, in the middle of a confused dream in which the driver was ineffectually trying to reverse the engine and I had got my head and shoulders well inside the box having a look round to see how things were going with the fire up by the brick arch, the door was thrown open and 5 o'clock announced.

Photo.] TAKING WATER AT PADDINGTON. [*Topical.*

In such circumstances one's toilet is quickly completed, and 5.20 a.m. found me on my way to breakfast, a dining-car being set aside in the carriage sheds at Old Oak Common, where meals were provided for voluntary and other workers. On presenting the "chit" with which I had been supplied, a plentiful helping of (rather fat) ham was set before me with tea, a huge hunch of bread and margarine. My order entitled me to "breakfast

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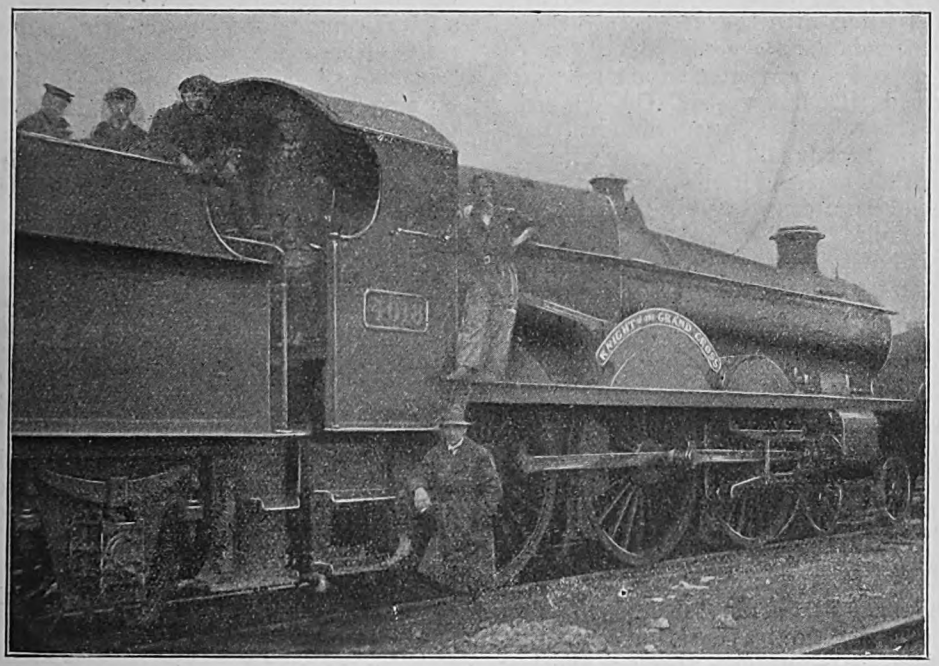
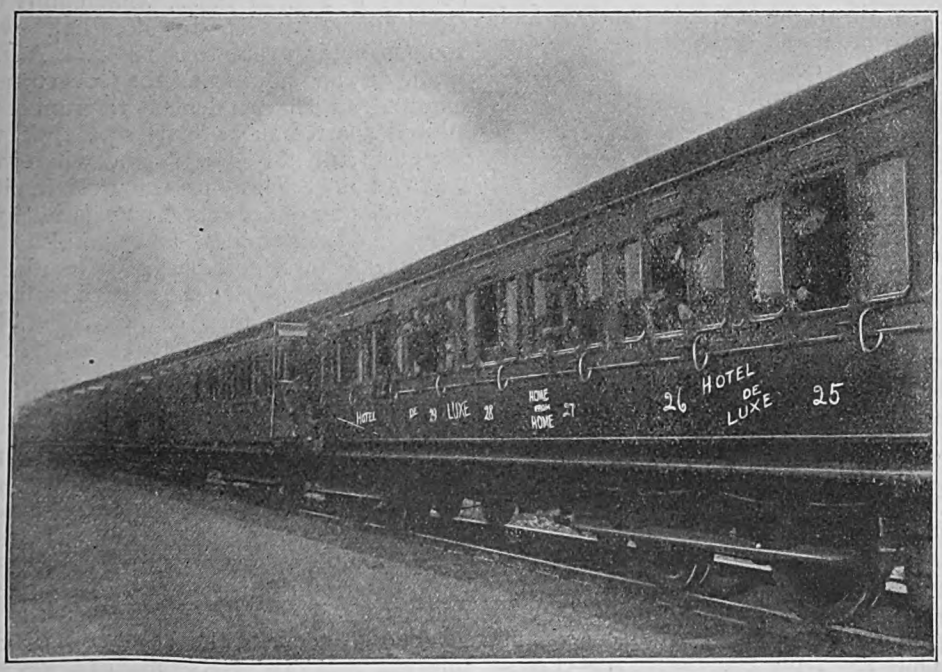


VOLUNTEER ENGINEMEN AND NAVAL STOKERS ON 4-CYLINDER LOCOMOTIVE "KNIGHT OF THE GRAND CROSS," AT OLD OAK COMMON SHEDS.



STEAM-HEATED COACHES USED AS SLEEPING QUARTERS FOR REGULAR AND VOLUNTEER ENGINEMEN AT OLD OAK COMMON.

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and a day's rations," and whilst I was battling with the first-named one of the attendants staggered along the car and deposited on the table a huge parcel wrapped in newspaper. On inquiring what this might be I was reminded that I had asked for breakfast and day's rations, but if they had said it was a week's supply I should have considered it liberal almost to a fault. Whilst cogitating over the remains of a second cup of tea, I was invited to partake of a helping of pickles by a uniformed server who, to add point to the suggestion, poised a gherkin of healthy proportions on the end of a fork. I declined with thanks. Fancy pickles at 5.30 on a raw autumnal morning! I was fortunate in that, for the greater part of the week, I was entertained by friends living within easy reach by 'bus or tram of the sheds, and to their house I repaired when off duty, sometimes, however, not until 1 a.m. or later. Of course, this meant that I had to pass the line of pickets on entering and leaving the company's premises, and—although towards the last I think they had me "weighed up"—I was subjected to nothing more than scrutinous glances, which, however, spoke volumes.

That day I was due "on shed" with Driver Wainwright at 6 a.m., and we had to coal, water and generally prepare our engine, being due "off shed" at 7 a.m. to take the 8 a.m. ex Paddington to Slough. The preliminaries occupied rather more time than was expected, our first difficulty being that of discovering the whereabouts of No. 5330, and, in the absence of the shedman, it was some time before we finally located it. Coaling, watering, sweeping up the footplate, oiling round, a visit to two separate turntables, &c., all took up time, and it was 7.30 a.m. before we pulled out clear of the yard and headed, tender first, for Paddington.

THE STRIKERS AND THEIR METHODS.

Even at that early hour strikers had taken up their stations at bridges and other points of vantage and hailed us with epithets that were meant, we gathered, to express disapproval of what we were doing.

At Southall we were again hooted by a body of strikers, but the passengers on the platform replied with hearty cheers which more than made up for the boos and satirical shoutings of the disgruntled crowd on the bridge. There was a fear that strikers congregated on over-bridges might resort to throwing missiles at the supposed "blacklegs," but in my own case I suffered nothing worse than having a large ball (made up of newspapers) thrown at me. It struck the cab side and glanced off on the tender. This occurred after dark, as may be supposed.

On the second return journey later in the day the number of strikers at the same point had grown, and amongst them was an elderly man who was making copious notes, including apparently the number of the engine and other particulars. On passing Acton we noticed strikers using field glasses, as a means presumably of identifying those on the engine, whilst near Westbourne Park we were "snapped" by a photographer who wore a red buttonhole, the badge of the railway striker.

That day we finished early, and in the evening I attended a big outdoor meeting of strikers. The principal speaker adjured his hearers to remember that in 1914 they were called 'eroes "mawching up and dahn the street with bends playin'." "Now," he asked, "what were they? If it took 500,000 men to run the railways of this country in normal times, what could the Government expect to do, not with 100,000, but less than 10,000 men." A long tirade on the iniquities of the Government followed, with particular reference to alleged shortcomings on the part of the Premier and "Geddes," and then the "Government spies" present were invited to "make a note of that," or was it "put that in their pipes and smoke it.' Periodically we got back, with almost painful redundancy, to the British railways and their 500,000 men, &c., &c., &c., but more was to come. Just as things appeared to be getting dull for want of something in the way of an original remark, the speaker appealed to any one present to say whether or not it was fair that the Bishop of London should have £10,000 per annum whilst certain railway workers had to live on "seventeen bob a week." This, apparently, was too much for a listener on the outskirts of the crowd, and as he elbowed his way further in, he loudly exhorted the speaker to confine himself to facts as at present existing and not quote from those of 25 or 30 years ago. The dissentient imme-

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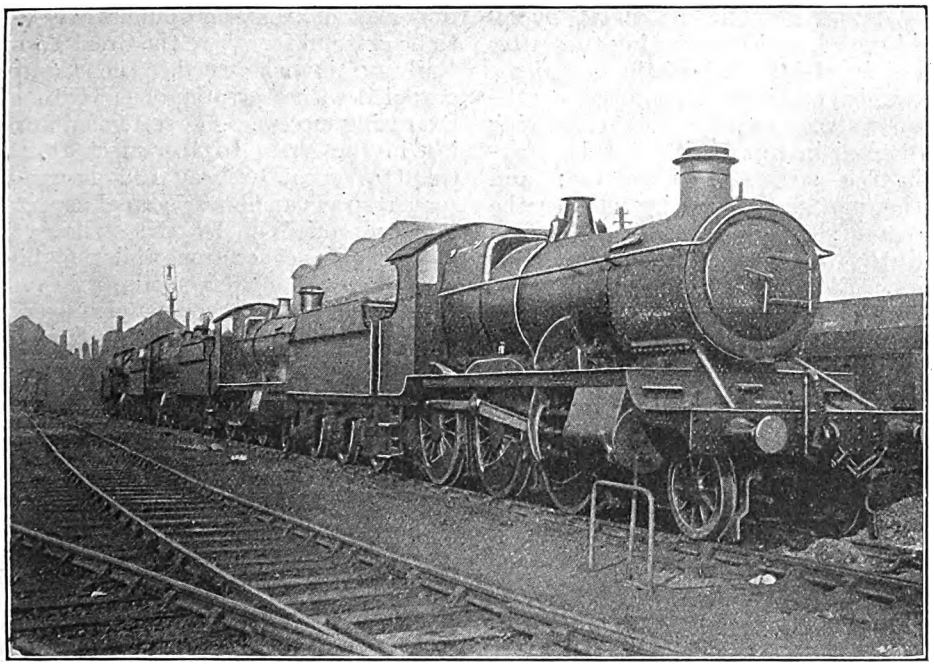
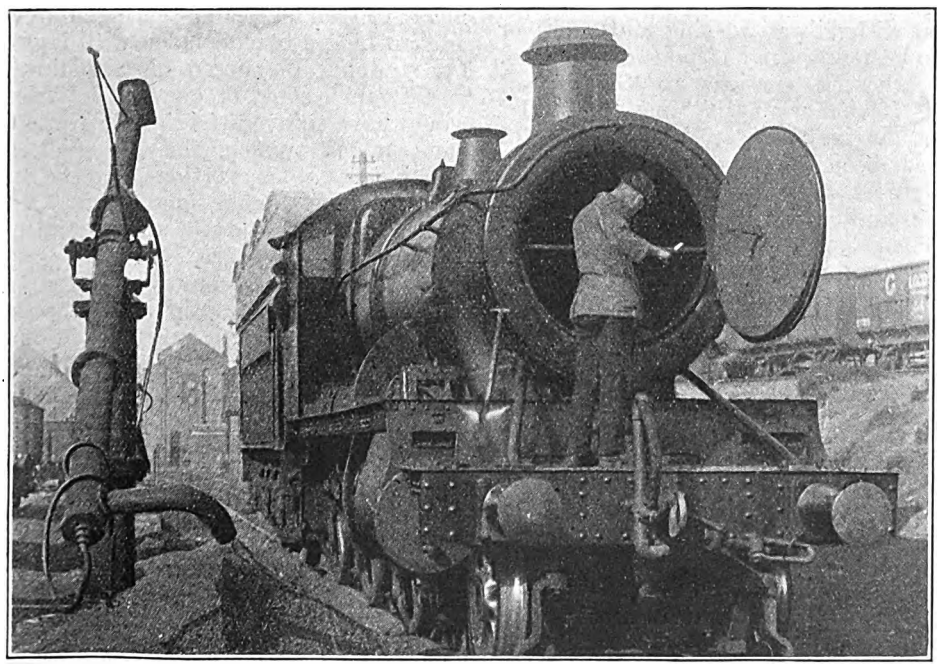


GREAT WESTERN RAILWAY 2-6-0 LOCOMOTIVES.
These engines did good work on London–Southall–Slough trains during the strike.



THE END OF THE TRIP.
No. 5330 (fired and later driven by Volunteer Chas. S. Lake) at Old Oak Common after finishing a day's work.

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diately found himself surrounded by an excited crowd, and the meeting thereafter resolved itself into two distinct sections, one of which continued to ponder over the 500,000 railwaymen, the fact of having been heroes in 1914 with bands playing in the streets, and so on; and the other apparently debating whether the interrupter should or should not be consigned to the canal in the immediate vicinity. Evidently the "Noes" had it, as the main discussion had, I noticed, been resumed when I passed half an hour later, the challenger having apparently come to terms with his opponents, as he had returned to the rôle of listener on the outer fringe of the crowd.

ENGINE DRIVING DURING THE STRIKE.

My next day's trip was the late turn, and on this occasion I had my first experience of driving under strike conditions. It was a welcome change after the exertions of firing, and by this time the company had secured the services of some naval stokers from H.M. destroyers and other vessels. These men made short work of keeping up the steam supply, and, indeed, seemed to regard the job as an easy one, but they were, of course, not conversant with railway working, and the driver had to keep an extra sharp look-out ahead. The earlier instructions to "ignore all signals" (the original "time interval" system having been re-introduced) had by now been withdrawn, and a fairly complete staffing of the boxes between London and Slough, mostly with amateur signalmen and instructors, made it possible to resume the ordinary full block system working between these points. The journeys were for the most part without incident, although on one occasion a volunteer guard, on his first trip, gave us the "right away," whilst further down the platform the regular guard was waving a white light to signal "draw up a bit" to the enginemen.

At some of the stations, especially on the later homeward trips, the platforms were absolutely besieged with passengers, a solid mass of humanity often hailing the arrival of the train with cheers and bantering remarks. The 5.45 p.m. from Paddington was a very popular train. The passengers fought for seats in it, but it was all a good-natured business, "*Anything* to beat the strikers" being the universal motto. The public have a lot to be grateful for where the Great Western Railway is concerned. The Company grappled with a great problem with ever-increasing success. The statement appearing in the Press to the effect that the Great Western Railway had assumed in some respects an almost normal aspect was greatly scoffed at by the strikers. On more than one occasion whilst making a station stop I noted a goods train on the up slow line and through passenger and milk trains either approaching or passing the station at the same time; our own train standing on the down slow, that is to say, all roads were occupied at the same point at the same time, and, obviously, in the most normal circumstances, nothing more than this could have been achieved. The public as a whole appeared to be thoroughly appreciative of the efforts made by the Company and those working on the line to maintain a service, and I shall always treasure the shilling which a beaming old lady handed me with her blessing on arrival at Paddington one evening. On another occasion, whilst drawing in to No. 5 platform, I noticed a friend of old standing, a K.C. whom I have not seen for years, wearing an overall and pushing a barrow laden with luggage. On stopping I claimed his acquaintance and I fancy some of our mutual friends would have enjoyed the sight of these two amateur railwaymen, the one spick and span in spite of his exertions, and the other bearing unmistakable signs of his "vocation," shaking hands in the presence of the outgoing passengers.

The last-named, however, were not apparently unanimous in their appreciation of our efforts, as it was pointed out to me by a somewhat irascible gentleman at Paddington—a first-class passenger by the way—that the train was five minutes late. He seemed very annoyed, but that five minutes had gradually accumulated in trying to squeeze about twice as many people into the train as it was meant to accommodate on the way up.

BACK TO WORK. A TYPICAL INCIDENT.

There remains one incident which, I think, is worthy of mention. I had been firing to Wainwright all day earlier in the week and we were feeling our way down to the sheds about 10.30 p.m. in a light ground fog, with the moon shining faintly

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overhead. We were held up for some minutes near the Old Oak Common box, and whilst there my attention was drawn to a solitary figure seated on the other side of the railings at Wormwood Scrubs. "There," said Wainwright "is a striker," and advancing to the side of the cab he shouted across the several pairs of rails and lines of wagons, "Hi, you there, why don't you get back to work?" No reply was at first vouchsafed, but after a second challenge, shouted even louder than the first, there came back through the fog in somewhat faltering accents, the words, "I'd like to.' "This," remarked Wainwright (a loyal servant of the company, indeed) "is a case for a few words," and with that he jumped down from the engine, ran across the track and, climbing the bank, was soon alongside the railings. The other advanced likewise, and there in the foggy atmosphere they stood, one on each side of the barrier, the loyal servant and the (evidently reluctant) striker, discussing one of the greatest problems of the day—in the abstract, perhaps—but nevertheless as a practical individual question. A minute later Wainwright returned saying that the striker had made up his mind to come in on the following morning. Other dutiful railway servants whose conversations I overheard denounced the strike in no measured terms. They knew their duty to their employers, themselves and their dependents, and they would not, for all the "leaders," deviate from the path they considered right. All honour to them.

* * *

The result of my volunteering has been advantageous all round from my point of view. In the first place, I am happy in the recollection that (at a modest computation) I was instrumental in helping to convey at least 10,000 people to and from their homes; secondly, I have increased my store of locomotive knowledge; and last but not least I have, I hope, extended my list of railway friends. I met with every possible courtesy from Mr. Crump, the London Divisional Locomotive Superintendent; Mr. Hall, his assistant; Inspectors Spencer and Townley; Mr. Hancock, the Chief Foreman at the Sheds; and Mr. Pritchard, Chief Locomotive Foreman at Paddington, and any slight inconvenience caused by the somewhat exacting nature of the work (to one grown unaccustomed to it) was more than compensated for by the other circumstances which attended it.

GREAT WESTERN RAILWAY,
GENERAL MANAGER'S OFFICE,
PADDINGTON STATION, W.

October 10th, 1919.

DEAR SIR,

I am desired, on behalf of the Chairman, Directors, and Officers of the Company, to express their profound appreciation of the splendid response to the call for volunteers to help in carrying on the Railways during the Strike.

They tender to you their grateful thanks for placing yourself at the disposal of the Great Western Railway in this emergency, and for the services which you so readily and so usefully rendered.

Yours faithfully,

W. C. Shake
Bedford.

Frank Aldington

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Photo]. [*E. Hulton & Co., Ltd.*

ELECTRIC TRAIN : MANCHESTER-BURY SERVICE.
A half-hourly service was maintained during the greater part of the strike period.

How the "Business Line" dealt with its Labour Troubles.

THE LANCASHIRE & YORKSHIRE RAILWAY DURING THE STRIKE.

TO deal adequately with the various methods adopted by the different British railways to keep traffic moving during the recent railway strike would occupy more space than the RAILWAY MAGAZINE can afford, but by the courtesy of Mr. Ashton Davies, Superintendent of the Line, Lancashire and Yorkshire Railway, we are able to include a succinct and, at the same time, illuminating narrative of the plan of campaign put into operation upon what is generally known in the north of England as "The Business Line."

On the receipt of the intimation that the railway strike would take place, the Lancashire and Yorkshire Railway Company, anticipating that a large number of their men would be involved, took steps with regard to the disposal of traffic already in transit, and made arrangements for it to be worked into goods yards and exchange sidings, so as to avoid trains being left in undesirable places on the main line.

Instructions were also issued as to what was to be done when the signal boxes were closed, and station masters were instructed as to the position the facing points of the junctions were to be left, so that the best use could be made of the engine power available during the strike. These arrangements were satisfactorily carried out.

When the strike took place no less than 98 per cent. of the traffic operating staff failed to report for duty.

As a result of the Government's appeal for volunteers to assist in the working of the railways a large number of offers of assistance were received, and a staff of upwards of 400 was engaged. These

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were made use of for platform duties, assistant guards, firing and assisting on the engines, working to the instructions and under the supervision of loyal men and inspectors.

Naturally, with such a depleted staff, only a very limited number of trains could be run, but the best possible was done under the circumstances. Including the electric services in the Manchester district 232 passenger trains were run during the period September 27 to Sunday, October 5. There were no Sunday passenger services on October 5, the engines available being utilised for goods services.

In connection with the electric services from Manchester and Liverpool which serve the residential districts adjacent to those cities, arrangements were made for obviating undue overcrowding of the trains.

Perishable traffic conveyed by passenger train, which was on hand at the commencement of the strike, was disposed of through dealers or the local food officer on best possible terms, so as to obviate it becoming unfit for consumption. The staff were busily engaged for some time in clearing the traffic from the trains and platforms to the various parcels offices, and, in order to effect delivery of the

LANCASHIRE & YORKSHIRE RAILWAY.

Passenger Department,.....Station, ...19....

A.....ex .....

consigned to you cannot be delivered owing to the **LABOUR TROUBLES.** Possession can be obtained at the Parcel Office here on surrender of this post card, and I shall be glad if you will kindly arrange accordingly early.

The consignment remains on hand at OWNER'S risk and expense, and failing removal and payment of charges due within six months of this date, it will be disposed of on behalf of whom it may concern, and without further notice.

Failing immediate removal and payment of any charges due, Perishable Traffic will be disposed of at once.

.....Agent.

POSTCARD ISSUED TO CONSIGNEES OF PARCELS AND LIKE TRAFFIC.

Each evening a list of trains arranged for the following day was distributed to newspapers, post offices, food controllers, and to the principal hotels and clubs in the districts concerned, this method of publicity being much appreciated by commercial men who were held up.

The passenger services arranged gave access to the principal towns of Lancashire and Yorkshire, and from these towns passengers were able to proceed on their journeys by tram to their destination, whilst those who found themselves stranded at Blackpool, Southport and other Lancashire Coast resorts made use of the services which enabled them to reach home.

accumulation of parcels at various stations, postcards were sent to consignees advising them of traffic on hand and requesting that arrangements be made for collection, seeing the company were unable to deliver, and it is of interest to note that this arrangement proved satisfactory.

With a view to assisting in the forwarding of food supplies, instructions were issued to the stations that perishable traffic could be accepted for conveyance where train services permitted. Obviously these consignments had to be restricted, and their acceptance was subject to the senders' arranging for the loading, unloading, handling, &c. Live stock in transit

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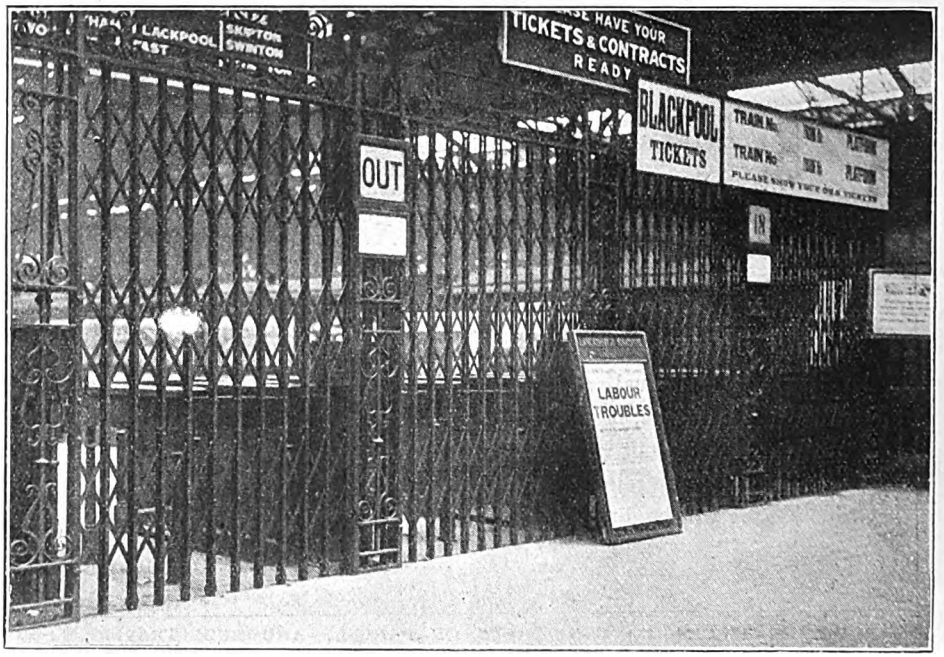
was stabled, fed and watered until the dispute was over.

The advantages of the company's control system were demonstrated in a striking manner when dealing with the traffic arrangements. The Central Control Office at Manchester is connected by telephone with practically all stations, signal boxes, &c., and by means of these comprehensive telephone facilities it was possible to receive by 6.45 a.m. and 2.45 p.m., daily, complete information of the total number of staff who had taken duty on early, middle and late turns respectively at each



Photo]. [*E. Hulton & Co. Ltd.*

COLLECTING BARRIERS AND ENTRANCE TO SUBWAY AT MANCHESTER (VICTORIA) STATION CLOSED DURING STRIKE.

station. From these particulars the Superintendent of the Line was able to determine what percentage of men in each grade were at work on the whole of the system, and to make definite arrangements for the next day's programme.

The stationmasters also reported by telephone every two hours to the Control Office, when advice and instructions were given to them.

Shortly after the commencement of the strike the Control Office obtained, through the stationmasters and agents, particulars of traffic on hand at goods yards, mineral yards, outlying sidings, exchange and marshalling sidings, and the necessary arrangements were at once instituted for effecting delivery of all live stock, food stuffs, perishable traffic, &c., control telephones being utilised for sending advices through the staff at the destination stations to the consignees, when the latter arranged for delivery to be taken at whatever place the wagons were held up.

Information was also obtained of the stocks of traffic on hand at all sidings, &c., and particularly of coal traffic at the various collieries waiting to be worked forward, and of coal traffic on hand at intermediate stations, as well as at each particular station. This enabled a reasonably fair and equitable distribution of coal to be effected at any and every place.

It was also possible to ascertain which coal mines were working and what was necessary to enable work to be continued. As a result of the information, engines and men brought into use were utilised to remove loaded traffic from certain colliery sidings and to give a supply of

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empty wagons so as to avoid the work at the pits being brought to a stand.

Special attention was also given to the requirements of public utility works.

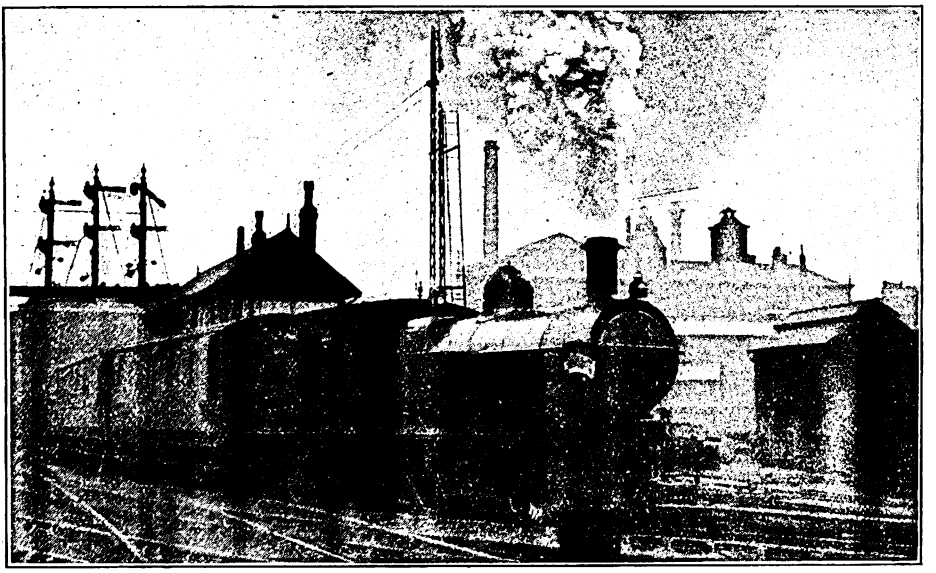
As the company officials found it possible to run passenger and other trains, information of the scheduled programme arrangements for each day were sent to all the stations concerned over the Control telephones, and each night, when it was found possible for stations to be closed, the same method of communication was adopted, which considerably conserved the energies of the staff at stations by preventing stationmasters remaining on duty unnecessarily, waiting to see whether any other trains were run.

The loyal staff and volunteers worked irregular hours, which allowed no booked time for meals, consequently it was necessary for arrangements to be made for them to be supplied with food. This developed into a big question, inasmuch as signalmen in isolated boxes, some distance from Manchester, had to be fed in addition to train men, loyal staff and volunteers.

By means of trains and motor-cars, food was forwarded from Manchester to the staff working at outlying stations. The whole of the catering was arranged by the Superintendent of the Line, and carried out by the company's own refreshment department, chiefly through Manchester (Victoria), whilst use was made of the dining rooms at other stations.

Many of the staff engaged in working the traffic were unable to travel to their homes each evening, consequently, in addition to catering, attention had to be given to the question of sleeping accommodation.

Beds were arranged at a number of the principal stations, whilst at Manchester use was made of one of the Head Office Conference Rooms, where a large number of beds were provided.



Photo]. [*E. Hulton & Co., Ltd.*

FIRST STEAM TRAIN TO LEAVE MANCHESTER (VICTORIA) STATION DURING STRIKE.

One of the problems during the period of the strike was to devise a method of getting letters containing confidential and important instructions, pay-sheets, &c., from head offices into the hands of the stationmasters and others concerned. This was achieved by the willing co-operation of stationmasters, clerical staff and volunteers.

The utmost use was made of the trains which were running, but the difficulty was to reach stations in districts where there was no train service.

Communication with those places was maintained by means of motor car, motor

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cycle, bicycle, tram car, and on foot. In some cases it was possible to maintain a direct motor car or cycle service between stations in a certain area and headquarters, but where this was not possible a scheme was arranged where letters were left at a central point or junction station. The stationmaster retained those for his own particular station, whilst he or one of his clerks would walk (or use tram if available) to the next station, there handing the remainder over to be dealt with in a similar manner.

This was repeated until the chain was complete. To carry out an emergency arrangement of this kind on a single occasion makes heavy demands on those responsible, but to repeat it on several consecutive days is an achievement.

In the training of volunteers for duty as signalmen, the company's school of signalling at Manchester was utilised, and over 150 volunteers took a special course to enable them to qualify for the position of signalmen, and arrangements were made for the whole of the signal boxes required to be opened for block purposes to be manned by trained men.

To ensure safety the company's control system formed an important link, as before any signals for the passage of a train were lowered, not only was the necessary permission obtained on the block telegraph, but the authority of the control office was also obtained. Special staffs were trained in the control office to undertake this safety working.

When the strike was settled, to allow of industries to be kept going, special instructions were issued with regard to the disposal of the accumulation of coal traffic, and on Monday, October 6, 150 engines were employed exclusively for this purpose.

The best test of the success of these arrangements is indicated by the fact that the full normal September service of passenger trains was running before noon on October 6, whilst booked goods train workings were introduced as from midnight on that date, another example of the adaptability of "The Business Line."

A "STROUDLEY" VETERAN ON THE BRIGHTON LINE.

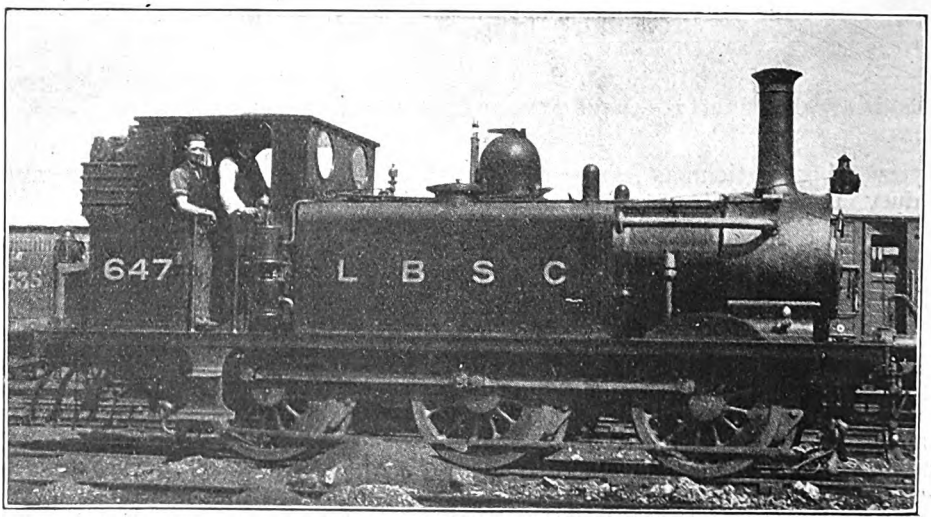

Photo.] [*A. B. MacLeod.*

ONE OF THE FAMOUS "TERRIER" TANK ENGINES STILL IN SERVICE AT BRIGHTON.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN.

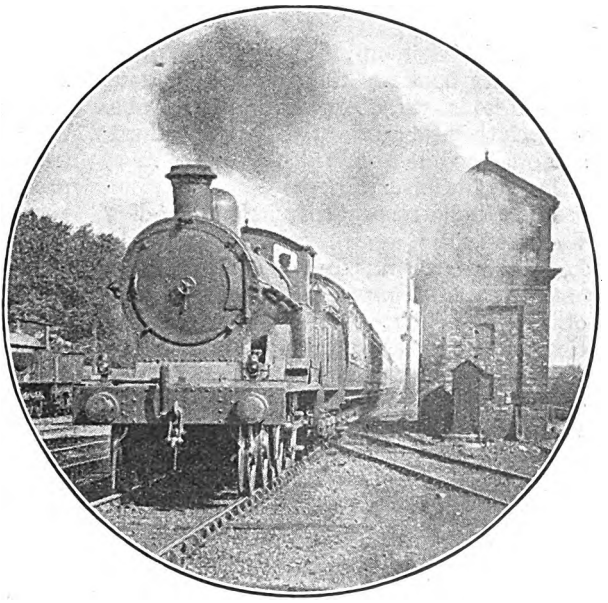

Photo.] [*Chas. S. Lake.*

LONDON & NORTH WESTERN RAILWAY.

Liverpool to Euston express passing Bletchley engine sheds at 60 miles per hour. 4-4-0 superheater "Precursor" locomotive.

THERE is no question that the practice of train timing, even in these parlous times when so little of current locomotive performance is worthy of record, engrosses a wider and wider circle of devotees. Not infrequently have I received letters from youthful aspirants who have expected me, I rather think, to introduce them forthwith to the position of train-timer-in-chief on the railway of their particular fancy, and it has been my painful duty to enlighten them as to the fact that such positions do not exist, and that most companies are content to carry on, when they require them, with timings of a very much more approximate and less detailed character than those which appear in these columns. Other letters, however, touch on matters of considerably greater importance in connection with the "art"—for accurate timing is unquestionably an art in which long-continued practice can alone make perfect—and two such communications I propose now to touch on briefly.

"Frequent opportunities of long-distance travelling," begins one writer, "are denied to some of us, and it often happens that an observer, when passing over an unfamiliar route, will note a great number of passing times which are valueless from the standpoint of the locomotive work performed, and will altogether omit, by reason of his imperfect acquaintance with the route, the times of passing really important points, such as the summits of long gradients or the beginnings and ends of recognised service slacks. And even when one is fairly well acquainted with a route, it is not too easy to learn which are the mile-posts marking the salient points of it. Moreover, half the interest in logs lies in their comparison with other logs, and if different observers happen to choose different places at which to book the passing times, detailed comparison of the results is impossible." The writer then suggests the publication of a detailed summary of timing "hints," the strategic features of each main line being dealt with *seriatim*, and adds: "To give a concrete instance, if I were asked to decide the salient points in a start-to-stop run of a London and North Western train from Stafford to Crewe, I should say:

Time of leaving Stafford.
,, passing mile-post 139.
,, ,, ,, 148.
,, ,, ,, 156.
,, stopping at Crewe.

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"Having thus only five entries to make in his log-book in the course of about half-an-hour, the observer would be able to clock the first mile or two out of Stafford, and quarter-miles up Whitmore bank, more or less at his leisure."

With all due respect to my correspondent I cannot fully agree with his methods. Logs whose passing-times are taken almost entirely at mile-posts are open to serious objections. In the first place, they practically demand a seat at the window on the mile-post side of the coach, which in these days is not *always* to be had for the asking. It is possible on the Midland Railway, the "four-foot," or kept unpainted and in bad condition.

To my mind, again, it is inadvisable to take timings only at such comparatively lengthy intervals as those my correspondent proposes. My own practice is to take the passing time at every station, save only where they are situated at exceptionally close intervals, as in the suburbs of London, supplementing these times with additional times at important "strategic" points, such as those referred to by my friend. The importance of such manifold data is easily explained. First of all, there are extraordinary variations in the

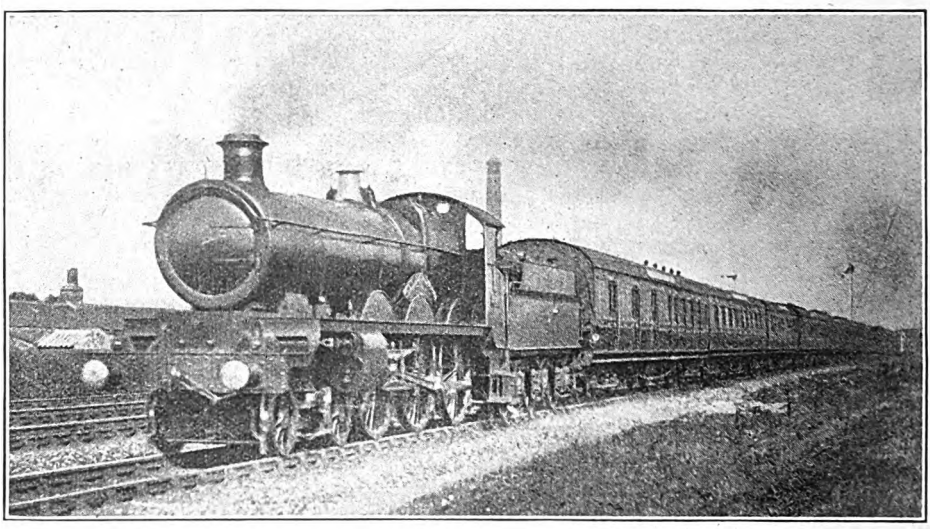

Photo.] [*H. T. Worlock.*

GREAT WESTERN RAILWAY.

Down Plymouth express near Hayes. 4-6-0 four-cylinder locomotive, No. 4010, "Western Star."

where mile-posts are exceptionally large and clear, to read them across the compartment, but in such circumstances very close concentration would be required, and an important post might easily be missed. Secondly, it is impossible to take any records at night in these conditions. Lastly, there is no inconsiderable strain in any case in watching closely and continuously for individual mile-posts, unless one is perfectly well acquainted with the route, and the beginner especially is liable, if depending on mile-posts rather than stations, to make serious errors or omissions, more especially on those lines where the mile-posts are small, or set close against work of different drivers, and an adequate series of times will show exactly where one man has evidently given his engine another "notch," or another driver has begun to ease down owing to being before time. Again, one may be noting some record running, when—as, alas! is so often the case—there comes a sudden signal check or other delay. This might occur near the end of my correspondent's 9-mile stretch, whereas my log would give the time of passing Standon Bridge, and I should thus be in possession of the record times up to within a mile or two of the check, and consequently able to calculate with comparative exactitude the cost of the delay,

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Lastly, and most important, even the most careful of observers will occasionally misread his watch. With timings taken at fairly close intervals even the inexperienced recorder should be able to detect obvious errors that have been thus incorporated in his logs. As I have mentioned previously, I only wish that readers who forward their logs to me would pay a little more attention to this point ; some of them probably have little idea how inaccuracies discount the value of recorded performances, and how many of these I have had to set on one side as unreliable and thus unfit for publication.

In regard to the question of locating strategic points in the running, to which I have just referred, another friend writes : " Might I suggest that, for the benefit of inexperienced timists like myself, you should give occasional tips as to the position of important signal boxes, displaced mile-posts, and other catchy points? As an instance, it is quite possible to pass through Westbury and Landore stations on up trains and miss them altogether ; I have done it once in the latter case, and very nearly in the former." Wherever possible, for my own purposes I fix the beginning or termination of an important grade by a signal-box or station, rather than by a mile-post. The former is far less likely to be missed than the latter (at night it is well-nigh impossible to pick out a mile-post, unless its exact position be known), and generally there is at least a signal-box sufficiently closely adjacent to the particular point required to afford a reliable indication of the work performed on the " bank." A mile-post timing is, of course, sometimes essential, as, for example, mile-post 59¾ on the Midland main line, at the summit of Sharnbrook and Irchester banks, but a brief sojourn in the corridor or some other point of vantage, should this be necessary, will permit of the post being " caught." In regard to the general suggestions of both my friends, I will bear them in mind when describing performance in the future.

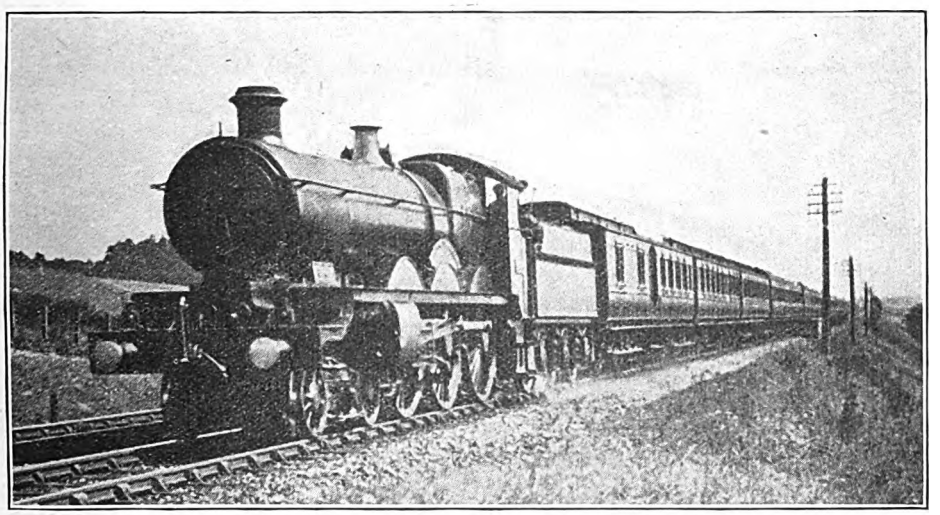

Photo.] [*Capt. G. G. Templar, R.A.*

GREAT WESTERN RAILWAY.

Down Birmingham and North express. 4-6-0 four-cylinder engine, No. 4037, " Queen Philippa."

I would also once again emphasise the vital importance of *accuracy* in the record of performance. This may to some seem a tiresome reiteration of a self-evident fact, but that it is a lesson not yet learned by some readers will be evident if I quote another letter in which a reader relates his experiences. " I should like to submit to you," he writes, " a very good run on the L.N. & W.R. (*sic*). The engine was *Wolfhound*. I forget the number, but it was of the 4-4-0 class. I was travelling on the 5.5 p.m. from Crewe to London (Euston) non-stop. Our load consisted of eleven eights and one dining car. We were due

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to leave Crewe at 5.5 p.m. "—seeing that this was the 5.5 p.m. train, a departure at that time might certainly be expected—" but after shunting the Manchester portion on to the rear of the train we eventually left at 5.22 p.m. I never timed the train throughout the journey, but we made some fine running until within 20 miles of Euston, and we had not only made up the 17 min. which we were late, but were actually running before time, as we were subject to bad signal checks all the way from Watford to Euston. *Our speed did not average more than* 15 *m.p.h. the last* 20 *miles* "—the italics are mine—" and then we ran into Euston at 8.38 p.m., or two minutes before time. I think, sir, that you must agree with me that the engine in question performed some very smart work considering the size of the engine."

I must, indeed. To run at 15 m.p.h. for 20 miles would consume a total of 80 min. The train must therefore have passed the 20th mile-post out of London (where the arrival was at 8.38 p.m.) at 7.18 p.m., or, allowing, say, an extra minute for stopping at Euston, at 7.17 p.m. Incidentally, the fact of signal checks in these conditions would not be surprising, as the express would thus be running approximately 55 min. ahead of time. Further, as the start from Crewe was at 5.22 p.m., the 138 miles from there to mile-post 20 must, as a natural consequence, have been compassed in the truly astounding time of 115 min., at an average speed, including Stafford and Rugby slacks, of exactly 72 m.p.h. throughout! Of such slender material, I fear, have many of the world's famous record runs been made!

But in so writing I have other and more serious amateur timing efforts in mind. In a recent issue I gave details of a number of Scottish runs timed by readers, and so far as my memory serves there was barely a single one in which I did not find palpable errors in either the times or the speeds, or, again, in the loads, and several I had to reject altogether as impossible in one way or another. It is a mystery to me, for example, how any observer who brings any thought at all to bear on his work can write thus of three consecutive runs on the same train over the same stretch of line, with similar loads and engines: (*a*) " We passed Bannockburn, 2¼ miles (from Stirling), in 3 min. 38 sec., at 51 m.p.h., Plean, 4 miles, in 7 min. 40 sec., at 61 m.p.h. . . . " (*b*) " We passed Bannockburn, 2¼ miles, in 4 min. 33 sec., at 39 m.p.h.; Plean, 4 miles, in 8 min. 17 sec., at the same speed . . . " (*c*) " We passed Bannockburn, 2¼ miles, in 4 min. 39 sec., at 45 m.p.h.; Plean, 4 miles, in 7 min. 46 sec., after a sustained speed of

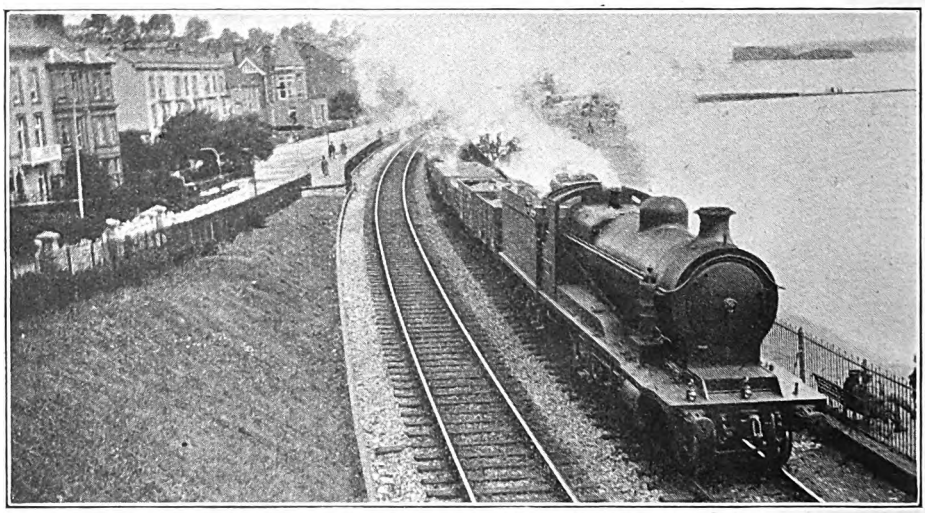

Photo.] [*F. H. Stingemore.*

GREAT WESTERN RAILWAY.

Goods train approaching Lea Mount Tunnel, Dawlish. 2-8-0 R.O.D. (Great Central Railway type) engine No. 3004.

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33 m.p.h. on the 1 in 119 stretch before that station, but speed rose to 60 m.p.h. before Larbert . . ." The errors here are so perfectly obvious. For in (*a*) the passing time at Bannockburn should clearly be 4 min. 38 sec., and not 3 min. 38 sec.—the other runs at once proclaim the former time as correct. Then again, how on earth could there be so extraordinary a variation in the speeds on the three runs in view of the comparative uniformity of the times? For the solution, look at (*c*). In run (*a*) 51 m.p.h. was obviously the speed attained before beginning the ascent to Plean, and 61 m.p.h. the maximum speed on the subsequent descent before Larbert; in (*b*) 39 m.p.h. must have been the minimum speed on the ascent to Plean; while in (*c*) the figures are correctly described. But surely a little careful scrutiny might have put these details right before the runs were dispatched to me! I trust that this terrible exposure will prove in the nature of a *verb. sap*: *sat.* to some of my young and enthusiastic co-timists.

By the way, in addition to the companies which I mentioned recently as affording visible indication of the tare weight of their vehicles, I find that several others require inclusion. The South Eastern and Chatham and Lancashire and Yorkshire Railways both affix small cast-iron plates to the ends of their coaches, giving the tare tonnage in white letters on a black ground. Oval plates are employed on the South Eastern and Chatham Railway and rectangular plates on the Lancashire and Yorkshire Railway, in both cases fixed at the waist-line of the vehicle, *i.e.*, about 3 ft. above platform level. In a similar position the Great Southern and Western Railway, of Ireland, paints the tare weight in white block letters, while Mr. Glover, the Locomotive Engineer of the Great Northern Railway, of Ireland, has devised a clear and compendious plate, also fixed in the same position, which shows the tonnage above, the overall dimensions of the vehicle below, and the letter classification for traffic purposes at the right-hand side. In order to collate this information as to tare weights for the information of amateur timists, I am hoping shortly to publish a drawing which will make clear the position and type of indication favoured by each company.

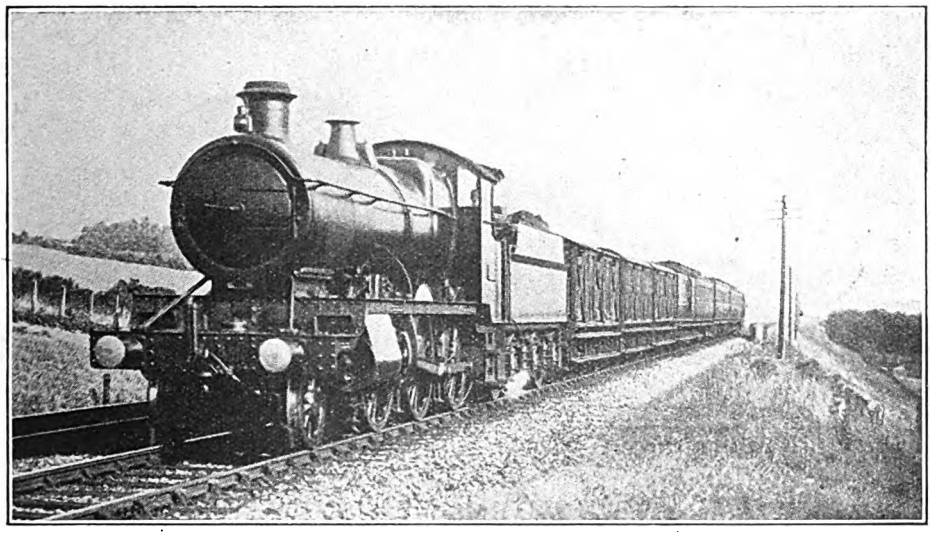

Photo.] [*Capt. G. G. Templar, R.A.*

GREAT WESTERN RAILWAY.

Slow Passenger and Milk Train. 2-6-0 engine, No. 4367.

And now for performance. I think that the bulk of my readers must have spent their first peace vacations in the south and west of England, as I have received a positive *embarras de richesse* in the shape of runs on the London and South Western and Great Western Railways during the past few weeks. Which is just as well,

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seeing that unusually heavy preoccupations in other directions have prevented me this summer from sampling the current work of either of these companies. We will begin with the Great Western Railway, and even with the briefest of descriptions of the running, I fear that it will be necessary to postpone the London and South Western journeys to a subsequent month.

Of two runs from London to Exeter, *via* Westbury, one was made on the 10.15 a.m. down, prior to its reversion to the old time of 10.30 a.m. and the omission of stops at Westbury and Taunton, while the other was on the non-stop 11.30 a.m. In the former case 4-cylinder 4-6-0 No. 4053, *Princess Alexandra*, took out of Paddington twelve 70-ft. cars weighing 396 tons empty and 435 tons full, (the train being packed), while in the latter No. 4038, *Queen Berengaria* was at the head of an eleven-coach train weighing 369 tons tare and 395 tons full. Southall, 9·1 miles, was passed in 13 min. 58 sec. and 13 min. 4 sec. respectively, after which No. 4038 suffered an exceedingly bad relaying check lasting almost from Southall to Hayes. So the times to Slough, 18·5 miles, were 23 min. 11 sec. and 25 min. 13 sec; to Maidenhead, 24·2 miles, 28 min. 46 sec. and 30 min. 36 sec.; to Twyford, 31 miles, 35 min. 45 sec. and 37 min. 8 sec. and to Reading, 36 miles, 42 min. 58 and 42 sec. No.4053, which had just reached 60 m.p.h. on this length, was very badly slacked before and through Reading, while No. 4038, whose maximum was 65½ m.p.h., making the regulation slack at the West Junction, was nearly stopped at Southcote Junction for an up Basingstoke train to cross. With these initial hindrances the 17·1 gradually rising miles from Reading to Newbury occupied 21 min. 10 and 38 sec., and the 17 miles of steeper ascent on to Savernake 19 min. 52 sec. and 18 min. 2 sec. No. 4053, on the 10.15 a.m. down, had attained 56 m.p.h. before Newbury, but fell to 39 on the final 3 miles of the climb (2 at 1 in 180, ¼ at 240 and ¾ at 144), whereas No. 4038, previously touching 58½ m.p.h., compassed the last 3 miles in the excellent time of 3 min. 32 sec. with a minimum of 47½ m.p.h. No advantage was taken of the falling 25·5 miles to Westbury, which occupied 26 min. 39 sec. on the first run (to the stop), and 24 min.

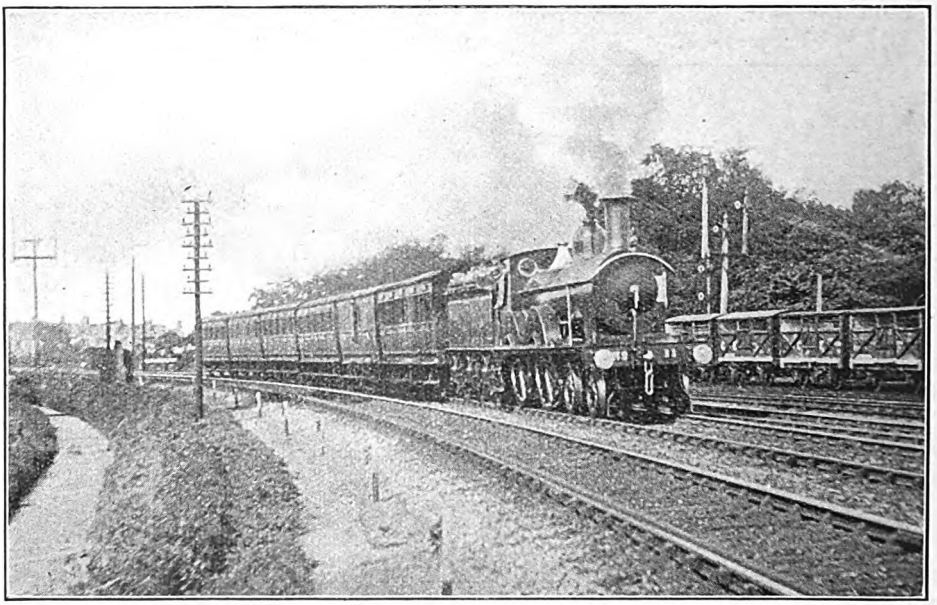

Photo.] [*K. A. C. R. Nunn.*

MIDLAND & GREAT NORTHERN JOINT RAILWAY.

Lynn-Mundesley train leaving Lynn. 4-4-0 locomotive, No. 11.

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19 sec. on the second. Total times from London, 95·6 miles, were therefore 110 min. 39 sec., or approximately 107 min. net (which was then the schedule time of this train), on the first run, whereas No. 4038 passed at 20 m.p.h. in 106 min. 41 sec., or 101¾ min. net, after a very cautious approach. Schedule allowance in the latter case is 103 min.

Beyond Westbury No. 4053 got through Frome, 5·7 miles, in 10 min. 31 sec., and, after the usual service slack, ascended the 7·2 miles to mile-post 122¾ in 10 min. 16 sec., with a minimum speed of 42 m.p.h. My correspondent mentions a very high speed as having been attained subsequently, but his times hardly bear this out (not to mention the nominal restriction of all maximum speeds on the Great Western Railway to 60 m.p.h.), the 6·8 miles on to Castle Cary occupying 6 min. 12 sec., and the 27·6 favourable miles over the "cut-off" thence to Taunton 29 min. 48 sec., inclusive of a 45 m.p.h. check at Athelney, and a slight check before Taunton. This gave a start-to-stop time of 56 min. 47 sec., or 55 min. net, from Westbury to Taunton, 47·3 miles, against an allowance of 57 min. After Taunton the interest of the run evaporated, as with a reduced load of 330 tons (360 tons full), a 4-4-0 "County" was allowed as pilot over Whiteball Summit, the 30·8 miles to Exeter occupying 37 min. 29 sec., or 37 min. net, well inside the 40 min. allowance. No. 4038 continued from Westbury to Frome, where a second 20 m.p.h. slack was made, in 9 min. 12 sec., running from there up to mile-post 122¾ in 10 min. 12 sec., with a minimum rate of 41 m.p.h., and thence down to Castle Cary in 6 min. 27 sec. The Castle Cary-Taunton length was run at the most moderate speed in 27 min. 49 sec., and a slack to 50 m.p.h. was made through Taunton Station, which was passed in 160 min. 12 sec., or 155¼ min. net from London. This slack hampered the ascent to Whiteball, the 10·8 miles occupying 16 min. 3 sec., while the speed fell as low as 19½ m.p.h., but the 20 miles on to Exeter were run in 19 min. 44 sec. to the stop, with a maximum of 70 m.p.h., and the total time from London was thus 1 sec. under 196 min., or 191 min. net.

Two up non-stop runs over the same course, received from another correspondent, offer a direct comparison between pre-war and present performance, No. 4054, *Princess Charlotte*, on the pre-war 12.5 p.m. up (allowed 185 min. to Paddington) having a gross load or 350 tons, against the 315 tons of No. 4002, *Evening Star*, on the present 1.45 p.m. to London, which has the standard 195 min. booking. Both engines are, of course, of the 4-cylinder 4-6-0 class, and both days were fine, save for a little rain between Castle Cary and Newbury on the second run. The pre-war journey offered considerably the brisker start, *e.g.*, 11 min. 51 sec. for the 8.4 miles to Hele against 13 min. 5 sec., while the 6.7 miles on to Tiverton Junction took 6 min. 48 sec. and 7 min. 26 sec., and the final 5 miles to Whiteball Summit 5 min. 51 sec. and 6 min. 38 sec. No. 4054's culminating half-mile—between mile-posts 174½ and 174—occupied 44 sec., while No. 4002 fell to 30 m.p.h. at the Summit. Whiteball Box, at the south end of Whiteball Tunnel, which almost exactly marks this important summit point, should on no account be missed by observers: it is 153 miles 59 chains from Paddington, *via* Westbury, and adjacent to the 174th mile-post, the posts here, of course, being reckoned along the old main line, *via* Bristol. But to return to the running: No. 4054 took 9 min. 36 sec. for the 10·9 miles from Whiteball to Taunton, and 4 min. 30 sec. more for the 5 miles on to Cogload Junction, where a very slight slack was made; whereas No. 4002 s corresponding times were 10 min. 18 sec. (with a momentary maximum of 72 m.p.h.) and 4 min. 46 sec., and a substantial slack to 40 m.p.h. was made over the junction. On passing Somerton, 48 miles, the gap between the two trains had widened to all but 5 min., No. 4054 having taken 50 min. 19 sec. from the Exeter start, and No. 4002 55 min. 17 sec. The former, indeed, had made an exceedingly fine start, with a sustained average of 60 m.p.h. up 3 miles of rising grades (mile-posts 184 to 181—Collumpton), and without an exceptionally fast descent of Wellington bank.

Then No. 4054 sustained bad signal checks at Charlton Mackrell and Castle Cary, with a subsequent permanent way check at Bruton, the three costing in all 8 min. As a result the 10·4 miles from Somerton to Castle Cary in this case occupied 14 min. 21 sec., and the 6·7 miles thence to mile-post 122¾ 11 min. 35 sec., against No. 4002's 9 min. 43 sec. and

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8 min. 22 sec. The latter was now over 1½ min. ahead of schedule and 2 min. 53 sec. ahead of No. 4054. Mile-post 122¾, by the way, is another very important summit, so much so that it is used in the working book as a point for passing times; the mileage to which it refers is actually that of the old Weymouth main line *via* Swindon, Chippenham and Westbury, but its actual distance from Paddington direct is now 108 miles 43 chains. No. 4002, unchecked, fell to 30 m.p.h. on the final ¼-mile to the top. Mile-post 122¾ to Frome, 7·2 miles, took 7 min. 43 sec. and 8 min. 7 min. 50 sec. and 10 min. 1 sec., while the steeper 16·8 miles to Savernake occupied 17 min. 55 sec. and 18 min. 26 sec. Both engines just exceeded 60 m.p.h. beyond Edington; on the long 1 in 122 from Lavington to Patney, No. 4054 fell to 50, and No. 4002 to 47½ m.p.h., and on the final 2¾ miles at 1 in 240-153 the respective minima were 53 and 50 m.p.h. The former engine did much the faster running from Savernake down to Reading, as was to be expected, the 17 miles from Savernake down to Newbury taking 14 min. 36 sec., against 15 min. 36 sec.,

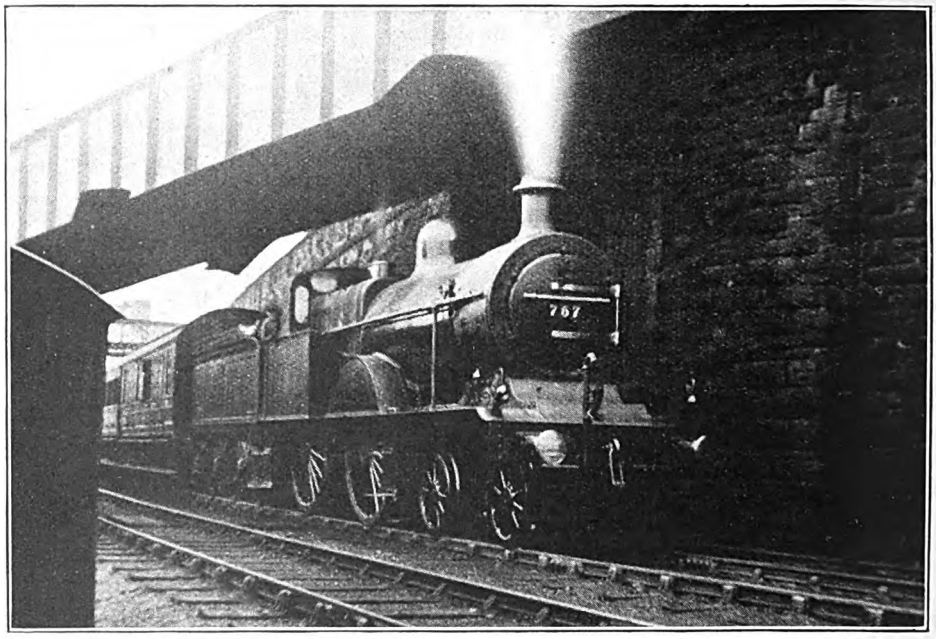

Photo.] [*R. D. Pollard.*

MIDLAND RAILWAY.

Manchester-Derby train at New Mills. 4-4-0 locomotive, No. 757 (Class 3).

sec., and Frome to Westbury 7 min. 45 and 23 sec., No. 4002 not being quite so drastic as No. 4054 in the reduction of speed at Frome. The former engine touched 70 m.p.h. before Frome and 67 afterwards, and both trains, of course, ran very cautiously through Westbury, to which point the total times were 91 min. 43 sec. (83¾ min. net) and 88 min. 52 sec. for the 78·1 miles.

In both cases first-class work was performed from Westbury up to Savernake, the comparatively flat 8·7 miles to Lavington, commenced very slowly, taking 9 while the ensuing 15·3 miles to Southcote Junction—another useful point for "timists"—occupied 13 min. 33 sec. against 16 min. 8 sec. No. 4002, although momentarily touching 69 m.p.h. near Hungerford, was for most of this distance doing very moderately, in view of the speed limit, whereas No. 4054 *averaged* 70·3 m.p.h. from Bedwyn to Aldermaston, 21·6 miles. Indeed, the latter engine, by covering the 1·8 miles from Southcote Junction to Reading, at much reduced speed, in 2 min. 44 sec., had gained over 7 min. on the present times from Savernake,

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whereas No. 4002 was materially "eased" after Newbury, being before time, slacked to 30 m.p.h. at Southcote Junction, and took no less than 3 min. 17 sec. from there to passing Reading. After that No. 4002 was slacked at Twyford for the "slip" in the bank on the down side, and accelerated remarkably well to a maximum of 70½ m.p.h. at Burnham Beeches, only to suffer a second and exceedingly severe p.w.r. check at Slough; nothing daunted, the driver worked up to 68 m.p.h. at Ealing, but was once again badly slacked by signal before Westbourne Park. With this succession of hindrances, the 36 miles in from Reading occupied 44 min. 8 sec., instead of the 40 min. allowed, but only 1 min. 38 sec. had been taken in excess of the 195 min. from Exeter, and my correspondent's allowance of 6½ min. for the delays, leaving a net time of 189 min., seems if anything to err on the side of modesty. No. 4054 was favoured with a clear road, and ran from Reading to Twyford, 5 miles, in 5 min. 34 sec.; from there to Slough, 12·5 miles, in 11 min. 12 sec.; Slough to Southall, 9·4 miles, in 8 min. 49 sec.; and Southall into Paddington, 9.1 miles, in 10 min. 51 sec.—total, 186 min. 47 sec., or 178¾ min. net from Exeter. The cream of this run was, of course, the fast finish of 67 min. 19 sec. for the 70·1 miles from Savernake into Paddington, inclusive of the prolonged slowing through Reading. But the comparison clearly shows that, with equivalent downhill running, there is little to choose between past and present-day performance over some sections of the Great Western Railway.

One or two runs on the old main line, where the timings are somewhat easier, can, however, be quickly disposed of. The 4-6-2 engine No. 111, *The Great Bear*, had a trifling task on the 6.30 p.m. ex-Paddington with a 280-ton train. Southall was passed in 12 min. 57 sec.; Slough in 22 min. 57 sec.; Twyford in 35 min. 42 sec.; Reading in 40 min. 48 sec.; Didcot, 53·1 miles, in 59 min. 7 sec.; Swindon, 77·3 miles, in 86 min. 10 sec.; Wootton Bassett, 82·9 miles, in 91 min. 51 sec.; and Chippenham, 94 miles, was reached in 102 min. 30 sec., or 1½ min. under the allowed time of 104 min. A check to 45 m.p.h. was experienced before Reading, and another slight one before Chippenham, leaving a net time of about 101 or 100½ min. Schedule times were closely adhered to throughout. I am indebted for details of this run to a correspondent now in Canada.

On the recently reinstituted 9.10 a.m. from Bristol to London, a 4-4-0 "County"—No. 3808, *County Limerick*—had an equally easy task with 230 tons. In the first instance 2 min. 20 sec. were regained by running the 11·4 miles to Bath in 15 min. 40 sec., and this was followed by the engine gaining another 5 min. 40 sec. to Didcot, which station, 53·8 miles from Bath, was passed in 58 min. 20 sec. Intermediate times were: To Chippenham, 12·9 miles, including the 2 adverse miles at 1 in 100 through the Box Tunnel, 16 min. 50 sec.; to Wootton Bassett, 24 miles, including also the 1½ miles at 1 in 100 of Dauntsey bank, 29 min. 40 sec.; and to Swindon, 29·6 miles, 35¾ min. Thence the 24·2 miles to Didcot were run briskly in 22 min. 35 sec., after which the engine was eased, and there was nothing much further to record. A slight signal check was experienced at Didcot, a worse one at Reading, and a dead stand for the same reason at Royal Oak, in addition to the Twyford p.w.r. check, so that the last 53 miles into Paddington took 63 min. 10 sec. Even so, the 122 min. schedule from Bath, 106·9 miles, had been improved on by ½ min., but the net time was probably not over 115 or 115½ min.

On the noon non-stop from Bristol, during the days when it incorporated the 8.30 a.m. from Plymouth, No. 4053, *Princess Alexandra*, 4-cylinder 4-6-0, had to tackle a 460-ton load by the Badminton route, and not unnaturally lost some time to the last-mentioned point. It took 12 min. 54 sec. to cover the 4·8 miles up to Filton Junction (including 2⅛ miles at 1 in 75), and the next 12·8 miles of practically uninterrupted 1 in 300 up to Badminton occupied 17 min. 22 sec.—total, 30 min. 16 sec. instead of the 27 min. allowed. But after that all was plain sailing, and the 100 miles on to Paddington were covered in 103 min. 54 sec. with no checks other than the usual service slack at Wootton Bassett. Badminton to Wootton Bassett, 17·1 miles, took 14 min. 50 sec—the average speed from Hullavington to Somerford was 73½ m.p.h.—Wootton Bassett to Swindon 6 min. 14 sec.; Swindon

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to Didcot 23 min. 30 sec.; Didcot to Reading 17 min. 6 sec.; Reading to Slough 19 min. 27 sec.—here the engine was running under very easy steam—and Slough into Paddington 21 min. 10 sec.—total, 134 min. 10 sec.

A much finer effort, timed by a young Cardiff friend, was made by the 2-cylinder 4-6-0 engine *Lady Godiva*, No. 2904, on the up Irish boat express with a 350-ton load. Starting very smartly from Newport, No. 2904 passed Severn Tunnel Junction, 9·8 miles, in 13 min., and despite a prolonged slowing through the tunnel, maintained 26¼ m.p.h. on the 3¼ miles at 1 in 100 out of the eastern end, and 30 m.p.h. on the for 2 min. 10 sec. at Uffington and a slack to walking pace at Cholsey—but the intermediate times show the rapidity of the recoveries of speed, *e.g.*, 5½ min. for the 5·8 miles from Swindon to Shrivenham, and 6 min. 40 sec. from Wantage Road to Didcot, 7·3 miles. Actually 120¾ min. were required for the 97·4 miles from Newport to Reading, start-to-stop—schedule is 122 min.—but net time was nothing over 111¼ min., on the basis of the "form" displayed. Some more good running was made from Reading, Twyford, 5 miles, being passed in 8 min. 50 sec.; Maidenhead, 11·8 miles, in 15 min. 20 sec.; Slough, 17·6 miles, in 20 min. 35 sec.;

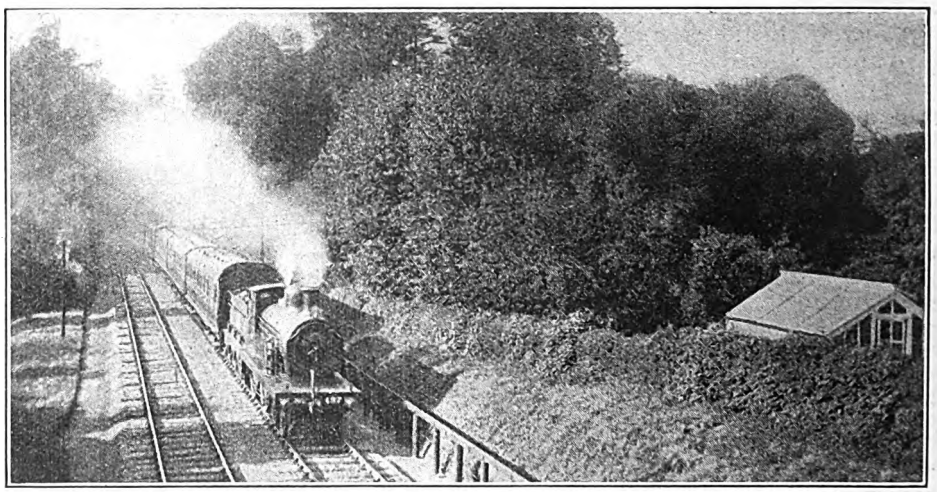

Photo.] [*G. H. Cannon.*

SOUTH EASTERN & CHATHAM RAILWAY.
Reading-London train near Guildford. 4-4-0 locomotive, No. 187.

subsequent 2½ miles at the same inclination from Pilning up to Patchway. So the 10·5 miles from Severn Tunnel Junction to Patchway were run in 17¼ min., and the 13·1 miles at 1 in 300 thence up to Badminton, where speed was sustained at 48 m.p.h., in 16 min. 55 sec. Despite a restraint of maximum speed to 67½ m.p.h. on the subsequent decline, No. 2904 ran from Badminton down to Wootton Bassett in 16 min. 50 sec.; and from there to Swindon in 6 min. exactly. By covering the 56·1 miles from Newport to Swindon in 70 min., 7 min. had been gained on schedule, but the latter includes a conditional stop of 1 min. at Badminton. Then followed signal checks—a dead stand and Southall, 26·9 miles, in 29 min. 55 sec., speed having now risen to 69 m.p.h. Unchecked, No. 2904 should have reached Paddington in very little over 41 min.—actually the time occupied was exactly 43 min., as booked. But the engine could be credited with fully 13 min. gain from Newport to London.

This reminds me of another young correspondent's contribution to this collection, wherein No. 4001, *Dog Star*, of the 4-cylinder 4-6-0 type, with 300 tons, recently covered the 30·3 miles from Reading to Ealing, start-to-stop, in the quite exciting time of 31¼ min. The 24 miles between posts 30 and 6 were run in 21 min. 50 sec., with a maximum rate of 68½ m.p.h. at

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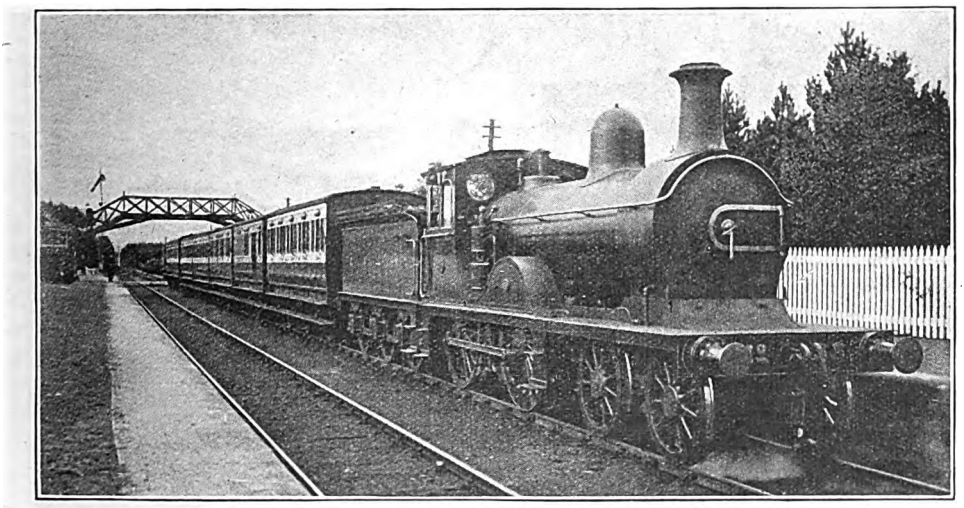
Slough. Resuming from Ealing after a "tube" stop of 40 sec., *Dog Star* covered the 5·7 miles into Paddington in 8 min. 55 sec. start-to-stop, thereby completing a gain of 8 min. 10 sec. on the schedule of this train from Reading to London!

My Newport friend returned home by the aid of the down Fishguard boat express at 8.45 a.m., the locomotive being 4-cylinder 4-6-0 *Queen Mary*, No. 4031, at the head of a 364-ton train. Loading being light, the gross weight probably did not exceed 375 or 380 tons. A leisurely start of 24 min. 10 sec. to Slough and 42 min. 50 sec. to Reading (stop) included a slight signal check at West Drayton; net time of 42 min. showed 1 min. loss on schedule. From Reading, Goring, 8·7 miles, was passed in 13 min. 20 sec.; Didcot, 17·1 miles, in 21 min. 50 sec., and Wantage Road, 24·4 miles, in 29 min. 20 sec., at 63½ m.p.h., but after this came a signal check to 24 m.p.h. near Uffington. Regaining 64½ m.p.h.—on slight ascending grades—at Shrivenham, No. 4031 then suffered a prolonged p.w.r. check, and so took 50¾ min. for the 41·3 miles to Swindon, where 5¾ min. had been lost from Reading. After Wootton Bassett slack, a maximum of 64½ m.p.h. was attained at Somerford, followed by a minimum of 53½ m.p.h. on the 1 in 300 at Hullavington, but a somewhat remarkable feat ensued in a recovery to 57 m.p.h. up the continuation of the same grade to Badminton. Swindon to Wootton Bassett took 6¼ min.; thence to Badminton 18 min. exactly—here the train was 6 min. late—and Badminton to Patchway 13 min. 40 sec., with a slight slack in Sodbury Tunnel and no higher subsequent maximum than 64½ m.p.h. Very moderate speed down to the Severn Tunnel was involved in a time of 14 min. 20 sec. from Patchway to Severn Tunnel Junction, and the last "lap" into Newport occupied 12 min. 55 sec. Total time from Reading was thus 5 sec. under 116 min., but all but 4 min. had been regained from Badminton, and the engine had not less than 5 min. to her credit out of a schedule of 114 min. This would leave the net time only 2 min. in excess of the pre-war schedule, and that despite a load at least 50 per cent heavier.



GREAT NORTH OF SCOTLAND RAILWAY.
Deeside train at Dinnet.

Here is another tribute to current Great Western Railway speed, reaching me from Spain, of all places, although the run was quite recent. On the 4.45 p.m. Worcester express *ex*-Paddington 2-cylinder 4-6-0 No. 2906, *Lady of Lynn*, had the benefit of a pilot—4-4-0 No. 3718, *City of Winchester*—working home, and the two engines made light of a 13-coach train weighing 410 tons. Southall was passed in 12 min. 3 sec.; Slough in 20 min. 47 sec.; Maidenhead in

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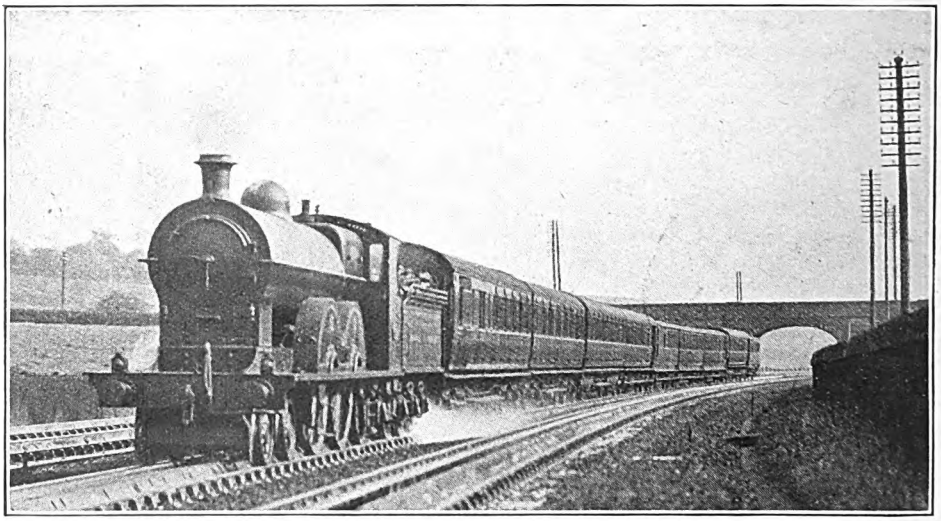
26 min. 10 sec.; Twyford in 32 min. 37 sec.; Reading in 37 min. 37 sec.; Goring, 44·7 miles, in 46 min. 28 sec.; Didcot East Junction (at reduced speed), 52·8 miles, in 54 min. 37 sec.; and Radley, 58·3 miles, in 60 min. 4 sec. After that came signal delays, but the net time to Oxford, 63·4 miles, was not more than 66 min. at most. Schedule is 70 min. Such a locomotive combination for a train of 205 tons after Oxford would have been capable of anything, but a general average of about a mile-a-minute was sustained up the rising grades to Campden Tunnel, and very little more beyond, save a brief spurt to 69 m.p.h. near Blockley. Handborough, 7 miles, 10 miles thence to Moreton, as steeply ascending in parts as 1 in 100, occupied 15 min. 20 sec.

After a stretch at "even time" from Moreton to Kingham, 7·1 miles, some very fast running was made, the 17·4 miles from Kingham to Yarnton taking only 14 min. 4 sec., at an average rate of 74·2 m.p.h. throughout. The remaining 3·8 miles into Oxford, including Wolvercot Junction slack, took 5 min. 9 sec. After that the French 4-4-2 compound *Alliance*, No. 103, came on, and did poorly to London, taking 74 min. 52 sec. with the usual slack at Didcot, a slack to cross from relief to fast lines at Maidenhead, and a signal



LANCASHIRE & YORKSHIRE RAILWAY.

Blackpool express picking up water at Lostock Junction. Aspinall 4–4–2 express engine.

was passed in 9 min. 54 sec; Kingham, 21·2 miles, in 24 min. 51 sec.; Moreton, 28·3 miles, in 31 min. 58 sec.; Honeybourne, 38.3 miles, in 41 min. 43 sec.; Evesham, 43·2 miles, in 46 min. 26 sec.; and Pershore, 49·1 miles, in 52 min. 30 sec.; Worcester, 57 miles, being reached in 61 min. 56 sec., or just over 3 min. inside time. On an up journey with the corresponding train (2 p.m. *ex*-Worcester), 4-4-0 No. 3719, *City of Exeter*, did well by comparison to keep the 65 min. schedule to Oxford, but for a trifling loss of 28 sec., despite a signal check before Evesham. Pershore was passed in 11 min. 6 sec.; Evesham in 18 min. 46 sec.; Honeybourne in 23 min. 55 sec., and the check at Ealing, which together did not warrant a loss of nearly 5 min.

Lastly, my Cardiff correspondent sends details of some quite noteworthy running between that town and Shrewsbury, on the 9.28 a.m. train, as a result of some very late starts from intermediate stations. First of all, a "Mogul"—No. 4373—took a 300-ton train from Newport up to Pontypool Road, 9·9 miles in 18 min. 10 sec. (schedule 20 min.) passing Ponthir, 4·2 miles, in 7 min. 25 sec., and not falling below 31½ m.p.h. on the 1 in 120-106-95 which extends continuously from there to Pontypool Road. After an inordinate wait at this station, No. 4360—of the same

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handy 2-6-0 type—backed on to a diminished load of 200 tons, and accomplished some quite record times to Hereford, passing Penpergwm, 6·7 miles, in 9 min.; Abergavenny, 9·4 miles, in 12 min. 5 sec. (not having fallen below 52 m.p.h. on the 1 in 160 from Penpergwm); and then maintaining 38 m.p.h. unvaryingly up the 4 miles at 1 in 81-94 to Llanvihangel Summit. Unfortunately, the time of passing the latter is not recorded, but Pandy, 15·7 miles, was passed in 20½ min.; Pontrilas, 20·9 miles, in 25 min. 55 sec.; Red Hill Junction (at reduced speed), 30·1 miles, in 35 min. 20 sec.; and a stop was made immediately outside Hereford platform, 33·4 miles, in 40 min. exactly. In view of the extremely moderate downhill speed, not exceeding 64 m.p.h. anywhere, this gain of 8 min. on schedule involved some really fine work. From Hereford 2-cylinder 4-6-0 No. 2935, *Caynham Court*, had to tackle a 50-axle train weighing 340 tons empty and 360 tons full, and made light of booked times, passing Dinmore, 7·5 miles, in 11 min. 20 sec.; Leominster, 12·6 miles, in 17 min. 10 sec.; Woofferton Junction, 18·9 miles, in 23 min. 50 sec.; Ludlow, 23·5 miles, in 28 min. 50 sec.; Craven Arms, 31·1 miles, in 37 min. 40 sec.; and Church Stretton, 38·2 miles, in 47 min. 5 sec. Here all but 5 min. had been gained on schedule, and this over a route continuously, or generally so, against the engine. The last 6 miles of the ascent are almost entirely at 1 in 100-115, but no lower rate than 35½ m.p.h. was recorded. The descent was commenced at 70 m.p.h., and Condover, 46·7 miles from Hereford, was passed in 55¼ min., but the usual series of checks outside Shrewsbury, including a dead stand of 1½ min., swelled the total time for the 51 miles to 65 min. 50 sec. Even this was 4 min. 10 sec. under the time allowed, but the net time of 62 min. showed an economy of 8 min. to the credit of the engine, and an improvement on pre-war figures. The locomotives had therefore gained in all nearly 18 min. between Newport and Shrewsbury.

I am fortunate in thus having been able, by the kindness of correspondents, to detail journeys over very nearly all the important fast-running sections of the Great Western Railway, and on the bulk of the crack timings also. Very refreshing in character, too, is the bulk of the performance described—"rare" indeed as well as "refreshing" in these times—and although perhaps on some occasions the maximum speed limit was not observed with all the rigour that the working time-tables demand, there is no doubt that the excellent permanent way of the Great Western Railway will sustain this, and very much more, without requiring any perceptible additions to the cost of its maintenance!

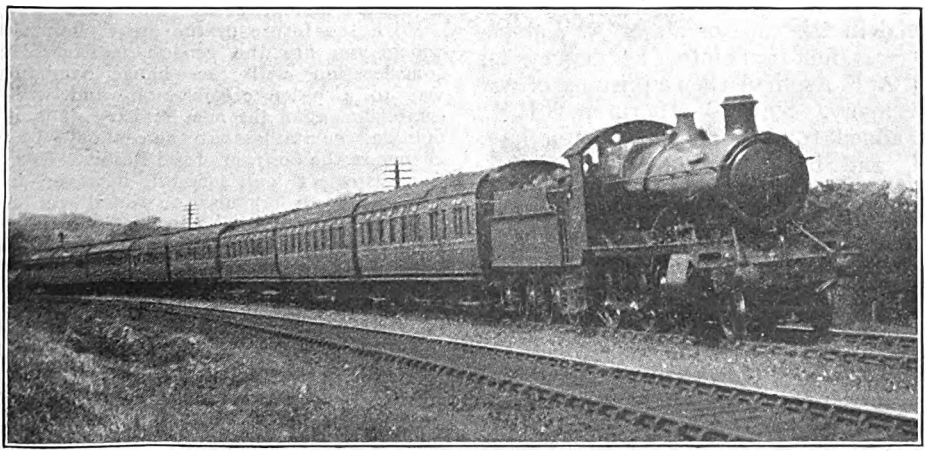

Photo.] [*E. L. Diamond.*

GREAT WESTERN RAILWAY.

South Wales express, *ex* Neyland, near Cardiff. 2-6-0 mixed-traffic locomotive.

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The Railway Executive Committee.

FROM August 4, 1914, until September 22, 1919, the direction of railway working in Great Britain has rested, in regard to matters affecting the relations between the Government and the railways, with the Railway Executive Committee. But with the coming into force, on September 23, of the Act constituting the Ministry of Transport the position became essentially altered, and formal letters of resignation, as set forth below, passed between the Railway Executive Committee, Sir Eric Geddes (as first Minister of Transport), and Sir Auckland Geddes (President of the Board of Trade).

As first constituted, the Railway Executive Committee consisted of Sir J. A. F. Aspinall, L.Y.R.; Sir A. K. Butterworth, N.E.R.; Sir Guy Calthrop, L. & N.W.R.; Mr. C. H. Dent, G.N.R.; Sir F. H. Dent, S.E. & C.R.; Sir Sam Fay, G.C.R.; Sir W. Forbes, L.B. & S.C.R.; Sir Guy Granet, M.R.; Mr. D. A. Matheson, C.R.; Mr. F. Potter, G.W.R.; Sir H. A. Walker, L. & S.W.R.; Mr. A. Watson, L.Y.R.

Death has removed the names of Sir Guy Calthrop and Mr. F. Potter, while Sir J. A. F. Aspinall and Sir Guy Granet have passed into honoured retirement. Sir Robert Turnbull, after serving in place of Sir Guy Calthrop until he reached England from the Argentine, was retained a member of the Committee; and this also applied in the case of Major A. Watson, who was first appointed as deputy for Sir J. A. F. Aspinall, then a prisoner of war in Germany. Sir H. W. Thornton, G.E.R., was added to the Committee at a later date, and by virtue of new appointments, Mr. F. Tatlow (M.R.), Mr. Charles Aldington (G.W.R.), and Sir Thomas Williams (L. & N.W.R.) have more recently become actual members. Sir Herbert Walker has throughout been Acting Chairman of the Committee. Major G. S. Szlumper served as Secretary to the Committee until recently, when his place was taken by Mr. G. H. Wheeler.

In a formal letter to Sir Eric Geddes, tendering their resignations, the members of the Railway Executive wrote, under date of September 23, as follows:—

DEAR SIR ERIC GEDDES,—In view of the inauguration of the Ministry of Transport as from to-day, it is probable that you may wish to reorganise the method of the control of the railways hitherto exercised by the Railway Executive Committee through the authority of the Board of Trade, under the Act of 1871. The members of the Railway Executive Committee, whose signatures appear hereunder, therefore beg to place their resignation in your hands. Sir Robert Turnbull, the remaining member of the Railway Executive Committee, has already tendered his resignation to the President of the Board of Trade.—Yours faithfully,

(Signed)

H. A. WALKER.	FRANCIS H. DENT.
SAM FAY.	F. TATLOW.
DONALD A. MATHESON.	CHAS. ALDINGTON.
WILLIAM FORBES.	A. KAYE BUTTERWORTH.
ARTHUR WATSON.	H. W. THORNTON.
CHARLES DENT.	I. T. WILLIAMS.

Railway Executive Committee (Board of Trade), 35, Parliament Street, S.W., September 23.

Sir Eric Geddes replied to this communication in the following terms:—

DEAR SIR HERBERT WALKER,—I have your letter, dated to-day, signed by yourself and your colleagues on the Railway Executive Committee, in which you tender your resignations. In receiving the resignations I am happy to be able to recall the very cordial expressions of goodwill which you extended to me at our meeting last week, and the assurance which you gave, both on your own behalf and on behalf of your colleagues, that I could look for your continued support and assistance in the task with which I am charged. That assurance was entirely in keeping with the traditions of the railway companies and of the Railway Executive Committee.

With the future of the great companies of which you are the general managers under consideration, with the change over from a war to a peace organisation, and with the establishment of the new Ministry, it is, in my opinion, inevitable that there should be some change in the position of the Railway Executive Committee. I look forward, however, to the creation of an organisation which will enable you and your colleagues to continue to give to the new Ministry much of the invaluable assistance which you have given to the Board of Trade during the past five years. I also look forward to a continuation of that co-operation between the railway companies and the Ministry of Transport which has existed throughout with the Board of Trade. As you are aware, there are in that connection certain matters under discussion between us which are not yet settled. All the powers of the Board of Trade in connection with the control of railways under the Act of 1871 are transferred to this Ministry by Section 3 (1) (*a*) of the Ministry of Transport Act, 1919. I hope, therefore, that the Railway Executive Committee will continue to serve for the next week or two, as they have been serving

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under the Act of 1871. I shall be glad to hear from you on this point.

Although the Railway Executive Committee has exercised its functions under the Board of Trade during the war, I would like to take this opportunity of saying how very much I have admired the effective and unostentatious way in which it has carried out its duties. I feel it has a record of which every individual member may be justly proud. It has performed services to the country during the past five years for which the country owes a very great debt of gratitude. The times through which we have passed have been very difficult for railway companies, and their record of war services, though depleted of operating, maintenance and renewal staff, and with many of their principal officers away on war work, is pre-eminent in the history of the railways of all belligerents. To this splendid result directors, management and staff have contributed as one, to an extent which can only be fully appreciated by those who have some inner knowledge of the difficulties, and of the achievements attained. I feel sure that in solving the railway problem, and the wider transportation problems which the conditions of war have imposed, the Government will continue to receive the same willing co-operation from the railways as a whole.

Yours very sincerely,

(Signed) ERIC GEDDES.

Ministry of Transport, 6, Whitehall Gardens, S.W. 1, September 23.

Sir Auckland Geddes, President of the Board of Trade, wrote to Sir Herbert Walker as under :—

DEAR SIR HERBERT WALKER,—Now that the control of railways has passed from the Board of Trade to the Minister of Transport, I should like to take an opportunity of expressing my high appreciation of the work of the Railway Executive Committee, and more particularly of yourself. I have had to depend upon you and the Committee for assistance in many very difficult matters, and I can certainly say that you have never failed me, and I shall always look back with pleasure upon my association with you and your colleagues in railway matters. I am sure that in times to come the Government may rely upon receiving the same whole-hearted assistance that they have received in the somewhat difficult period that we have passed through together.

Yours faithfully,

(Signed) A. C. GEDDES.

Board of Trade, S.W., September 24.

At this stage we may also refer to transport as dealt with at some length in the recently issued report of the War Cabinet for the year 1918. On the subject of railways the report makes the following observations :—

"No account of railway operations under Government control could be complete without reference to the Railway Executive Committee—the body which was, throughout the war, responsible for the management and working of the railway systems of the country. The Railway Executive Committee consisted of twelve general managers, drawn from the principal railway companies of the United Kingdom. It was constituted in 1912 as a separate department of the Board of Trade, its chairman being the President of the Board of Trade for the time being.

"On the outbreak of the war the Government, exercising the powers created by Act of Parliament, 1871, at once took over practically the whole of the railways of Great Britain and placed them under the general direction of the Railway Executive Committee. The number of railways and joint committees taken into control was 130, the total geographical mileage being 21,331, with a capital value of £1,200,000,000. The mileage controlled covers all but 2 per cent. of the railways of Great Britain. On January 1, 1917, Government control was extended to the Irish railways, and a special Irish Railway Executive Committee was set up with headquarters in Dublin.

"The Railway Executive Committee decided, from the commencement, on a policy of leaving the staff and the working arrangements of each railway under the control of its own management, and confined its functions to co-ordinating the work of the railways, and to dealing with those general problems which were common to all the systems and which, even in peace times, would have been solved by conference amongst railway directors and managers."

There is no need to tell once more the story of all that our railways have done individually and under the direction of the Railway Executive Committee, but in conclusion we may quote from a report by the Select Committee on Transport on the working of the railways under war conditions, which said :—

"The changes which have been introduced and the high efficiency which has been witnessed in the working of the traffic by the railways during the war, have been due far more to a patriotic determination on the part of all concerned to do their utmost to assist the country in the time of national emergency, regardless

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of corporate or personal interests, than to the direct imposition by the Government of its will upon the railway companies.

"The success that has attended the operation of the railways throughout the war, which has been superior to that witnessed in any other of the belligerent countries, affords conclusive proof both of the adequacy of the arrangements which had been made in advance, and of the capacity of those who had been concerned with their execution. There has been little dislocation, notwithstanding that in addition to a very large Government traffic the volume of civilian traffic both of passenger and goods has been heavier than in pre-war days, that large numbers of the staff have been inexperienced, and that considerable demands have been made upon the railways for rolling-stock and materials of all kinds for use with the armies abroad."

To what extent, and in what form, the services of the Railway Executive Committee will be retained as such has not yet been officially stated. With the conclusion of war conditions their direct work is done, and the Railway Executive "passes" with a record second to that of none of the many agencies which have assisted to bring the great war to a satisfactory conclusion. But individually, as general managers of great railways, and possibly in an altered form as a permanent advisory or consultative committee, there is still wide scope for their experienced consideration, and the future offers many possibilities for their active and useful co-operation with the Minister of Transport in the great tasks he has before him.

CANADIAN PACIFIC RAILWAY: TRANS-CANADA EXPRESS.

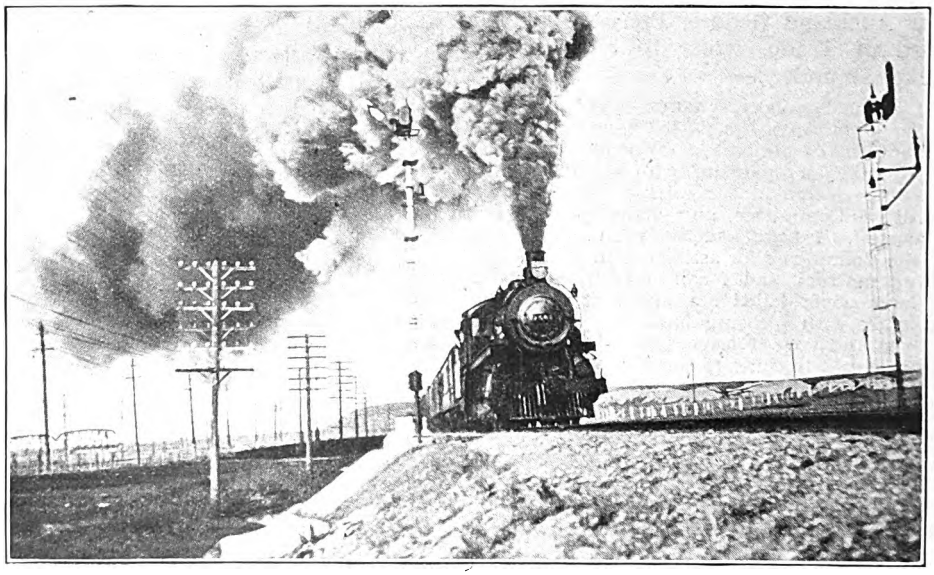

Photo.] [*C. Littlebury.*

THE RAILWAY MAGAZINE is indebted to Mr. C. Littlebury, of Calgary, for this view of the Canadian Pacific Railway's "Trans-Canada" Express, near Ogden, Alberta. This train covers the trip of 2,606 miles between Toronto and Vancouver in 4 days 8 hrs. 10 min.

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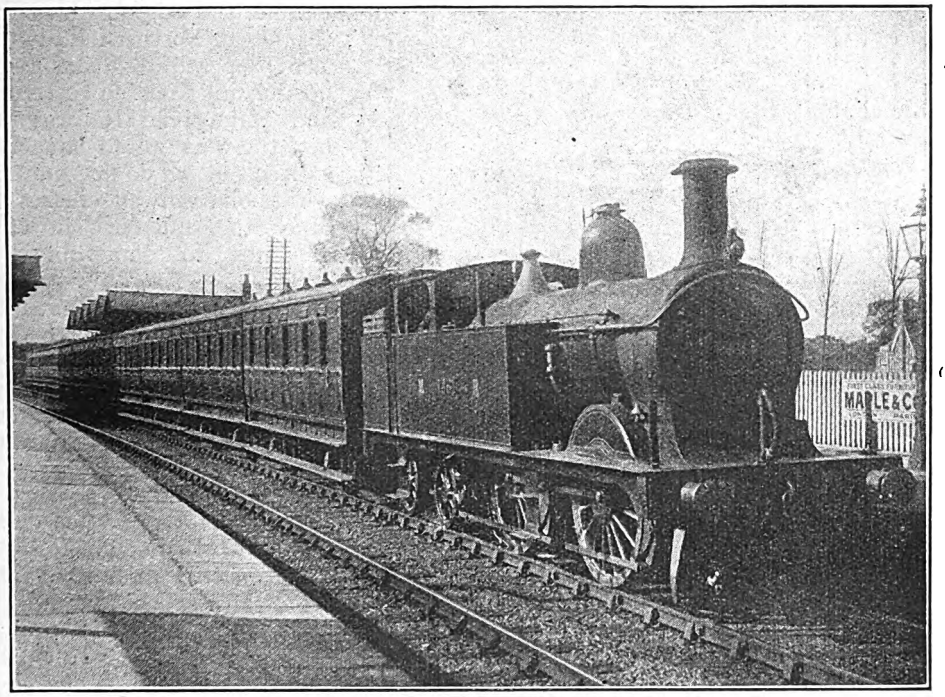

Photo.] [*H. L. Hopwood.*

MIDLAND SUBURBAN TRAIN OF FOUR-WHEELED COACHES.

0-4-4 tank engine, No. 1381.

The Tottenham and Hampstead Junction Railway.

By H. L. HOPWOOD.

IN view of its relative importance, it is somewhat strange that in the two published Histories* of the Midland Railway, very little information is given concerning the Tottenham and Hampstead Junction Railway, a line which is jointly owned and worked by the Midland and Great Eastern Railways. For this reason, and because many of the present writer's earliest recollections are associated with it, a descriptive account of this railway and its working arrangements is now presented. Brief reference will also be made to the Tottenham and Forest Gate Railway, as this forms a natural continuation of the Tottenham and Hampstead Junction Railway in the direction of East Ham, though it was constructed under a different combination of joint interests.

Acknowledgment is here made of the help rendered by a friend (formerly connected with the Great Eastern Railway) who has supplied many items of information of an interesting character.

It was in the early 'sixties that the Tottenham and Hampstead Junction Railway was projected, its purpose being to link up the Great Eastern and London and North Western systems in the neighbourhood of London. As indicated by the title, the line was to extend from Tottenham, on the Great Eastern Railway, to Gospel Oak, on the Hampstead Junction section of the London and North Western Railway, and there was to be a branch to the Great Northern main line near Hornsey. At one time the "Edgware, Highgate and London Railway" (which afterwards

* *The Midland Railway; Its Rise and Progress*, by F. S. Williams; and *History of the Midland Railway*, by C. E. Stretton.

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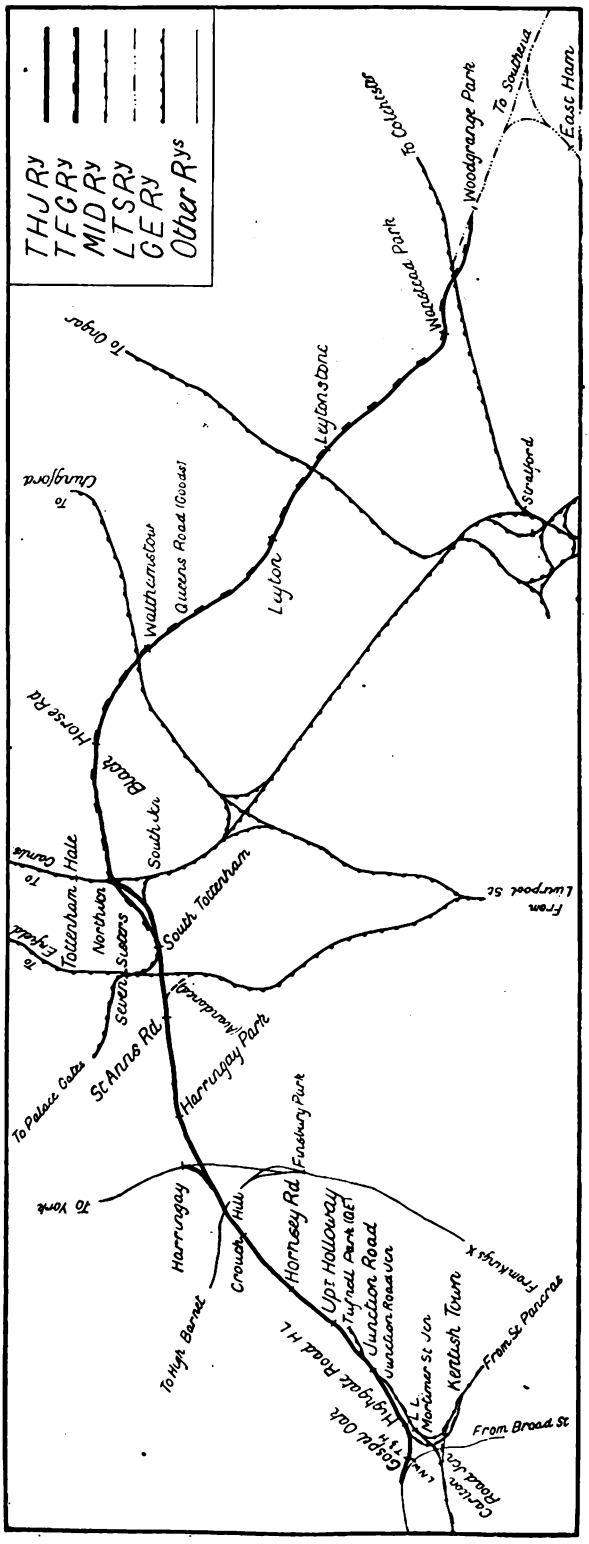

MAP SHOWING TOTTENHAM & HAMPSTEAD JUNCTION, TOTTENHAM & FOREST GATE AND ASSOCIATED RAILWAYS.

became the Edgware branch of the Great Northern Railway)† also proposed to make a connecting link with the Tottenham and Hampstead Railway, but how the work would have been carried out we do not know, as where one railway crosses the other, the difference in levels amounts to something like 70 ft.

It was anticipated that much of the London and North Western traffic for the London Docks would travel by the new route, but as a matter of fact such traffic was already passing—and had been for some years—by a route quite as convenient as the one proposed, *i.e.*, *via* the North London Railway, and it was to the mutual interest of the two companies concerned to keep this traffic in existing channels. This being the case, the London and North Western Company gave no encouragement to the new scheme.

Despite this lack of support, a Bill for the Tottenham and Hampstead Junction Railway was brought before Parliament, and it received the Royal Assent on July 28, 1862. In the previous June (one month, be it noted, before the passing of the Act) it was announced that the Great Eastern Railway had agreed to work the line from the date of opening.

In the following year—1863—the Midland Railway's London Extension was sanctioned, and it was realised that a connection between the two railways would be advantageous and be the means of providing the Midland Railway with access to the London Docks; accordingly, by Act of July 25, 1864, a line to connect the two systems near Kentish Town was authorised to be made by the Midland Company.

† See RAILWAY MAGAZINE, July, 1919.

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Construction of the Tottenham and Hampstead Railway was proceeded with, and it was expected the line would be ready in the autumn of 1867, but owing to circumstances arising out of financial difficulties which affected railway property at that time, the opening did not take place until July 21, 1868. The line then extended from Tottenham North Junction on the Great Eastern Railway to Gospel Oak Junction on the London and North Western Railway, and it was worked at cost price, with a passenger service between Fenchurch Street and Highgate Road. To give these trains a direct run the Great Eastern Railway constructed the short curve from Tottenham South Junction.

Originally there were stations only at Crouch Hill, Upper Holloway and Highgate Road, and west of the latter place the line was not used. A branch towards the Great Northern Railway was also partially made from near Crouch Hill to a point where Harringay station now stands, but the actual junction was not put in, the rails ending within a few yards of Great Northern territory. It was intended this should form an alternative route for Great Northern traffic to and from the Docks, but the branch, if completed, would have been of little use to the Great Northern Railway as the junction faced in the wrong direction for through working. The portion constructed remained derelict for some years, and was finally removed when Harringay station was opened on May 1, 1885.

Except in the vicinity of Upper Holloway, the district traversed by the line was quite open country in 1868. Passenger traffic was reported to have been very small, but it could hardly have been otherwise, for it appears that the total train service amounted to one train up to Fenchurch Street in the morning and one down in the evening! Receipts being less than working expenses, the Great Eastern Railway gave notice that it would discontinue working the line after January 30, 1870; and as a consequence passenger traffic ceased from that date. The Company's affairs were then being administered under the Court of Chancery, and the outlook was far from bright.

Meanwhile, the London Extension of the Midland Railway had been open since 1868, and, jointly with the Great Eastern, the Midland agreed in 1870 to work the Tottenham and Hampstead line. The connection from Kentish Town to Highgate Road, which had been authorised in 1864, was opened on January 3, 1870, and to the Tottenham and Hampstead route were diverted Midland goods trains which had previously reached the Docks *via* the North London Railway.

The line did not remain closed for passenger traffic for more than a few weeks after the Great Eastern trains were withdrawn, as early in 1870 the Midland Railway followed up its goods trains with a passenger service. At first these trains ran between Moorgate Street and Crouch Hill, but when, on May 1, 1871, a new station was opened at South Tottenham, they were extended to that place. It will be noted that in 1868 outwards traffic over the Tottenham and Hampstead Railway was from east to west (*i.e.*, from Fenchurch Street to Highgate Road), but now—in 1871—the direction was reversed, outwards trains running from Moorgate to South Tottenham.

The Midland Company had obtained running powers for goods trains over the Great Eastern Railway from Tottenham, and in return for these facilities, the Great Eastern Company was given powers to run passenger trains into St. Pancras. For many years the latter company had sought terminal accommodation nearer to the West End than Shoreditch station, and now the long-cherished ambition was realised. On July 1, 1870, Great Eastern trains commenced to run between St. Pancras and Tottenham. There were then five down and six up trains in connection with main line trains from and to Shoreditch.

Building operations were now extending, and additional traffic brought prosperity to the railway. A substantial dividend was declared in 1872, and thereafter the company continued to make progress.

In 1872 the Great Eastern line from Hackney Downs to Edmonton was opened for traffic, and a connection from it to the Tottenham and Hampstead line was partly made but never completed. The derelict embankment still remains and may be seen on the up side near St. Ann's Road station.

Additional stations at Junction Road and Hornsey Road had been opened by 1874; Harringay Park followed in 1880, and St. Ann's Road in 1883. At first,

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Harringay Park was called Green Lanes, but as there was another Green Lanes station on the Palace Gates branch of the Great Eastern Railway, the name of the former was altered to Harringay Park and Green Lanes. Subsequently the Great Eastern station was renamed—first as Green Lanes and Noel Park and later as Noel Park and Wood Green. Both stations are in Green Lanes,* one at Harringay and the other at Wood Green.

No trains had up to this time run west of Highgate Road station towards Gospel Oak, and about the year 1876 the opposite side, *i.e.*, between Seven Sisters and South Tottenham. This was used by some Great Eastern passenger trains running between Blackwall and Palace Gates, and afterwards between Stratford and Palace Gates. Necessarily, these trains ran a short distance over the Tottenham and Hampstead Railway and through South Tottenham station, but the service was soon withdrawn and the route was not used again until 1887, when the present Palace Gates-North Woolwich service was instituted.

On April 2, 1883, the Midland Railway

Photo.] UPPER HOLLOWAY STATION. [*H. L. Hopwood.*

physical junction between the Tottenham and Hampstead and London and North Western Railways at Gospel Oak was removed.

Reference has already been made to the abandoned curve near St. Ann's Road, and on January 1, 1880, the Great Eastern Railway opened another curve on the brought into use a further connection between its system and that of the Tottenham and Hampstead Railway. This line commenced at Carlton Road Junction, on the Midland main line, passed through a tunnel under the Kentish Town-Highgate Road line of 1870, and ran parallel with the Tottenham and Hampstead Railway (but at a lower level) until it joined the latter at the curiously named *Junction Road Junction*. By means of this line, a direct run from the north, and also from Brent Sidings to the Docks, Southend, &c., is available.

* Green Lanes is the name of the main road that goes from Stoke Newington to Enfield, but as it extends for some miles, it is alternatively called the High Road of the particular district passed through, *e.g.*, High Road, Wood Green, &c.

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In the summer of 1886 the Great Eastern Railway inaugurated a service between Highgate Road and Chingford. On weekdays there were 12 trains each way, and on Sundays the very liberal total of 11 to, and 10 from, Chingford was provided. During winter months there were 8 trains on weekdays and half that number on Sundays. Epping Forest was, of course, the objective of these Chingford trains—or rather, it was the passengers' objective—and the issue of ordinary return tickets at very little more cost than singles was an inducement to travel. For example, whilst the third-class single fare from Crouch Hill to Chingford was 8d., the return fare was only 10d. In the reverse direction the trains brought passengers from the Great Eastern line to Highgate Road, for Parliament Hill and Hampstead Heath, and on Bank Holidays this traffic was very heavy.

On May 27, 1888, an additional station was opened at Gospel Oak, and henceforth that place superseded Highgate Road as the starting point of Chingford trains. The new station had but a single platform, situated at the back of the up platform of the London and North Western station, and the physical junction (made in 1868 and removed in 1876) was not restored. Had this been done, and arrangements made for through trains to run between, say, Stratford and Willesden, or even Richmond, residents in the outer suburbs would have enjoyed the benefit of a through cross-country service, a facility that was badly needed some years ago. As it was, Gospel Oak existed only as a passenger exchange station. Eventually, the junction was laid in again, as will be seen in due course.

An important development of the Tottenham and Hampstead Railway was brought about by the opening of the Tottenham and Forest Gate Railway in 1894. Hitherto the former railway had been regarded chiefly as a suburban offshoot of the Midland Railway, although, of course, the Great Eastern Railway had utilised it as an alternative express route. But with the completion of the Tottenham and Forest Gate line the two railways became part of a through route from St. Pancras to London, Tilbury and Southend Railway stations. Jointly promoted by the Midland and Tilbury Railways, the Tottenham and Forest Gate Railway received its Act of Incorporation on August 4, 1890. The line was a continuation of the Tottenham and Hampstead Railway from South Tottenham to Woodgrange Park Junction on the Tilbury Railway, with passenger stations at Black Horse Road, Walthamstow, Leyton, Leytonstone and Wanstead Park, and a goods depôt at Queen's Road, Walthamstow. A new station at Woodgrange Park and a new curve giving access to East Ham station (both of which were made by the Tilbury Railway) completed the Tottenham and Forest Gate scheme.

On the opening of this line, which took place July 9, 1894, the Midland Railway extended some of the South Tottenham trains to East Ham, and also ran a through train from St. Pancras to Southend and back. In the winter of 1894, a few Midland local trains were working to Upminster, and in October, 1895, an express service between St. Pancras and Southend was introduced. For a few years these trains were worked by Midland engines—in fact, one was stationed at Shoeburyness for the purpose—but commencing in April, 1899, the working was transferred to Tilbury Railway engines.

Meanwhile, since 1892, the Great Eastern Railway had been running a through train between Gospel Oak and Southend, *via* Tottenham South curve and Channelsea Junction, on Sundays only in the summer months, but starting in the summer of 1895, this train ran daily.

When, 20 years ago, the widening of the Midland line between St. Paul's Road Junction and Kentish Town was made, opportunity was taken to improve the means of approach to the Tottenham and Hampstead Railway. Up to that time, trains between Moorgate Street and South Tottenham had to cross the fast lines on the level at Kentish Town and then climb the gradient of 1 in 48 to Highgate Road station. To facilitate the working of traffic a new spur was made from Kentish Town (Engine Shed Junction) to join the Carlton Road-Junction Road branch at Mortimer Street Junction, and this line had a rising gradient of 1 in 110 only, as compared with that of 1 in 48 on the old route. A new Midland station at Highgate Road, known as the Low Level, was also constructed and brought into use in 1901, and

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thereafter the original (Tottenham and Hampstead) station was called the High Level. The old approach to the latter station continues in use and serves, more particularly, the fast lines from St. Pancras, whilst the newer one is reserved for suburban trains.

On July 1, 1902, the Tottenham and Hampstead *Junction* Railway, which until then had been a line jointly worked, became purely a joint undertaking of the Midland and Great Eastern Railways, with the title, Tottenham and Hampstead *Joint* Railway. The line is maintained by the Midland Railway west of and including Crouch Hill, and by the Great Eastern Railway east of that station. The permanent way is formed of 85-lb. rails. In connection with the joint ownership it may be noted that the style of station buildings varies a good deal. The three original stations, Highgate Road, Upper Holloway and Crouch Hill, may be easily distinguished by their corrugated iron platform awnings (semi-circular in shape) supported on girders and iron pillars. The waiting rooms, &c., are brick buildings.

Junction Road and Hornsey Road stations differ in having wooden buildings. Harringay Park and St. Ann's Road, being on an embankment, are constructed entirely of timber. At South Tottenham, the up platform, with low wooden buildings dating from 1871, still exists, but the down side offices were renewed in red brick by the Great Eastern Railway when the Tottenham and Forest Gate Railway was opened. At the same time a large signal box was built on the up platform. Gospel Oak station, although situated on the section maintained by the Midland Railway, is of Great Eastern type, probably because it is used only by that company's trains.

In August, 1912, the Tilbury Railway was absorbed by the Midland Railway, and as a result, the Tottenham and Forest Gate line, which had been jointly owned by the two railways mentioned, automatically became Midland property.

During the construction of the Tottenham and Hampstead Junction Railway there were no particular engineering difficulties to be overcome. Between Crouch Hill and Harringay Park the track passes under two sections of the Great

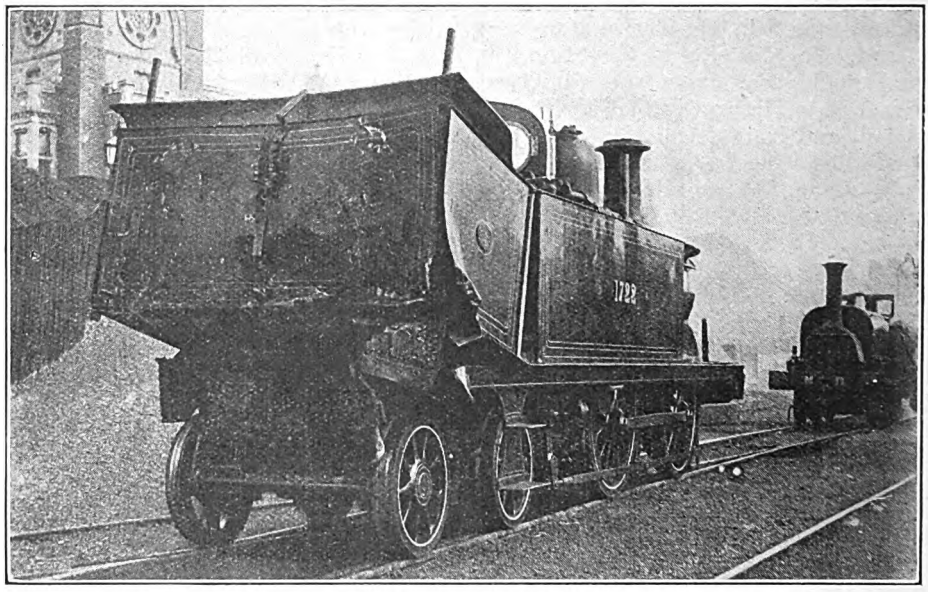

Photo.] [*Loco. Publishing Co., Ltd.*

THE RESULT OF A COLLISION.

Midland 0-4-4 tank engine No. 1722 after being run into by Great Eastern tank engine No. 579, between Crouch Hill and Harringay Park, March 19, 1887.

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Northern Railway (first the High Barnet branch and afterwards the main line). Hereabouts there is a falling gradient of 1 in 100, which continues to St. Ann's Road station. The line next passes under the Enfield branch of the Great Eastern Railway, and then rises for a short distance at 1 in 110 to South Tottenham station. At this point the Tottenham and Forest Gate Railway branches off to the left. The latter line proved a costly undertaking, having been made at a time when the district was built over, and a large number of roads had to be bridged. In addition, the railway crosses, at four places, different lines of the Great Eastern Railway, viz., at Tottenham over the Cambridge main line; at Walthamstow under the Chingford branch; at Leytonstone over the Ongar branch; and at Wanstead Park over the Colchester main line. The last-mentioned bridge has a span of 120 ft.

As far as Walthamstow the railway runs slightly below ground level and then climbs at 1 in 64 past Queen's Road goods depôt. Thence it is carried on a continuous viaduct of no fewer than 386 arches, 350 of them having a 30-ft. span. The most noticeable feature of this section is the extraordinary frequency of underbridges, to the number of 31. Beyond Wanstead Park the line falls at 1 in 100 and 65 to the junction with the Tilbury Railway at Woodgrange Park.

Recent new works on the Tottenham and Hampstead Railway include the restoration of junctions with the London and North Western and Great Northern Railways at Gospel Oak and Harringay respectively. In the first case there is a double-line junction, with a new signal-box, known as Gospel Oak No. 1; but the junction with the Great Northern Railway is only a single line curve between the down lines of the two railways. A new signal-box (Harringay Junction) has been opened on the Tottenham and Hampstead line, and at the Great Northern end connection is made with the down goods line opposite Harringay platform, where a ground frame has been installed for working the points. These connections, made in 1916, were constructed mainly to facilitate war period intercommunication. but have not yet been brought into use.

A further improvement is the provision of up and down goods loops from Junction Road to Upper Holloway. Between these stations, the Great Eastern Railway opened, some years ago, the Tufnell Park Goods and Cattle Depôt. This was principally to serve the Holloway Cattle Market, where a large cattle traffic was formerly dealt with, but the trade has declined considerably in recent years. Thirty years ago we well remember watching the very frequent arrivals on Saturday nights of long and heavy cattle trains from Norfolk stations.

A somewhat curious accident, in which 42 people were injured, occurred on this line on March 19, 1887. A Great Eastern engine and brake, about to return from Tufnell Park to Stratford, pushed out on to the up main line at Junction Road for the purpose of crossing over, but started away before the road had been set. The driver ran on the wrong road through three stations without anyone noticing the mistake, and between Crouch Hill and Harringay Park the engine and brake collided with the 4.55 a.m. Midland train from South Tottenham. What happened to the Midland engine is shown on page 336. Both locomotives were of the 0-4-4 tank type, the Great Eastern engine being No. 579 and the Midland engine No. 1722.

When the Midland Railway started running goods trains over the Tottenham and Hampstead Railway to the Docks in 1870 some of Kirtley's double-framed 0-6-0 tender engines of the 360-379 series were employed, and were fitted with short chimneys and small domes to suit Great Eastern loading gauge restrictions then in force. But in 1871 some 0-6-0 side tanks, built specially for the purpose, were delivered by Beyer, Peacock and Co. This was the 880 class, comprising 10 engines, Nos. 880-889. Like the previous engines, they had short chimneys and small domes. The spring balances were arranged one each side of the dome, instead of in the usual position on Midland engines. These engines, now reboilered and renumbered 1610-1619, are still running over the same route, supplemented by the two larger classes of 0-6-0 side tanks designed by Mr. Johnson.

Suburban passenger trains were at first worked by the Kirtley 0-4-4 well tanks, Nos. 690-695 (1869) and 780-799 (1870), now renumbered 1200-1225. These engines occasionally take turn with the later Johnson 0-4-4 side tanks (introduced in

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1875) in running the South Tottenham and East Ham trains, but they seem to be principally employed in working coal trains to South London depôts, two engines being used on one train. A few are also to be seen at St. Pancras as passenger shunting pilots. During their 50 years' career they have done a wonderful amount of hard work. When the writer first became acquainted with these engines, they had no cabs. Similarly, the Johnson 0-4-4 tank engines had only weatherboards. When Midland trains commenced running to Southend, the large 4-4-0 tender engine hired some Metropolitan Railway engines, and these travelled to Stratford via the Tottenham and Hampstead Railway, at that time the only available route.

The Tottenham and Hampstead Railway may well be termed the "Royal Route," for the King nearly always travels this way when going from London to Sandringham. In this connection it is interesting to note that the 3.55 p.m. St. Pancras to Hunstanton (Mondays and Saturdays only) ran in the winter months for the convenience of the late Prince of Wales (afterwards King Edward VII) and his guests, but

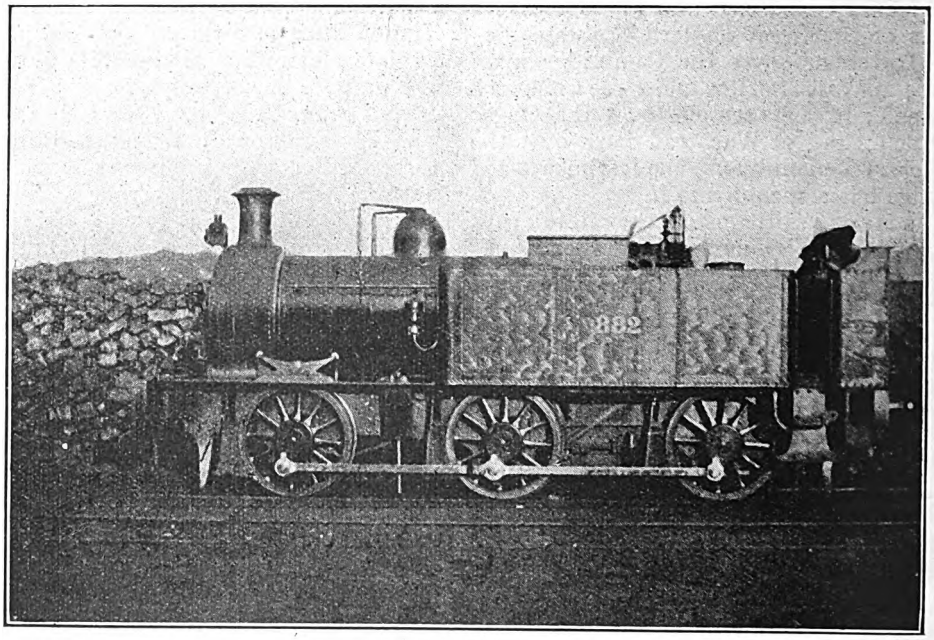

Photo.] [*Loco. Publishing Co., Ltd.*

MIDLAND 0-6-0 TANK ENGINE No. 882.
Built by Beyer, Peacock & Co., 1871.

No. 1757, *Beatrice*, was for a time stationed at Shoeburyness.

Among Great Eastern engines working main line trains into and out of St. Pancras 25 or 30 years ago were the Johnson 4-4-0. No. 306 (broken up in 1897); the Worsdell 4-4-0, No. 230 (formerly a compound); and the more modern oil-fired 2-4-0 engine, No. 760, *Petrolea*. The Gospel Oak-Chingford trains were then, as now, usually run by 0-6-0 tank engines.

As an item of interest, it may be recorded that the Great Eastern Railway, being temporarily short of engine power in 1872, tickets were also issued to the public. The train first ran on Monday, November 1, 1886, and conveyed, among other notabilities, the Grand Duke of Hesse. On that occasion it was worked by the Worsdell 2-4-0 engine No. 564. Whenever King Edward required to travel between Windsor and Sandringham without calling in London, a special was run via this route and was worked throughout by a Great Eastern engine.

Reference has been made to the various train services and the dates when they were introduced, and it will be useful

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to show the number of ordinary trains passing over the line during a normal period. For this purpose the time-tables of July, 1914, are selected, and the information is given in tabulated form as under. Saturdays only trains are omitted :—

	Down	Up
Midland trains—		
Moorgate Street, St. Pancras, South Tottenham, East Ham, Southend, &c.	62	57
Great Eastern trains—		
St. Pancras, Tottenham, Hertford, Cambridge line, &c. ..	7	8
Gospel Oak and Chingford ..	16	16

Density of traffic was greatest through South Tottenham station, as, in addition to the trains mentioned above, there were also those working the Palace Gates-North Woolwich service (11 one way and 12 the other), which called at South Tottenham and ran over 38 chains of the Tottenham and Hampstead Railway.

During the war, goods traffic increased very considerably, and coincidently a large number of passenger trains were withdrawn. This withdrawal was particularly noticeable in the case of Great Eastern trains, as, latterly, all of those from and to St. Pancras were suspended, whilst the normal Gospel Oak-Chingford service had been gradually reduced until there were two trains each way (one between Gospel Oak and Wood Street only). After September 30, 1915, these trains ceased to call at Highgate Road (High Level), which then became a "station closed," and it is now being demolished. The Low Level (Midland) station was also closed on March 1, 1918.

Some idea will be formed of the volume of goods traffic when it is stated that the Midland Railway runs trains from both St. Pancras (Goods) and Brent Sidings to the following depôts :—Bow, Poplar, Mint Street, Thames Wharf and Little Ilford Sidings. Those working from and to Brent travel direct via Carlton Road Junction; the others run via Kentish Town. Great Eastern goods and cattle trains to Tufnell Park come from Temple Mills and also from Cambridge line and Colchester line stations. Other Great Eastern goods trains between Temple Mills, Park Sidings (Tottenham), Palace Gates and White Hart Lane run via the South Tottenham-Seven Sisters curve.

Midland suburban "set" trains are made up of six bogie carriages totalling, according to the painted weights, 139 tons, or about 23 tons per coach. During the slack hours it is customary to run only four coaches. These trains replaced older close-coupled sets of 10 four-wheelers.

One peculiarity of this railway is that no separate time sheets are printed, Midland and Great Eastern trains being found only by reference to the time tables and bills issued by the respective companies. Tickets—of both owning companies' patterns—are headed "T. & H. J. R."

Between Junction Road Junction and South Tottenham there are two sets of mileposts. Those on the north side are the original posts and measure from Tottenham North Junction to Gospel Oak. On the south side the posts record distances from St. Pancras. The latter extend to Woodgrange Park and they date from the opening of the Tottenham and Forest Gate Railway in 1894. Appended is a table of distances, and from this it will be noticed that the stations are very close together :—

	m.	ch.
Tottenham N. Junction with G.E.R.	0	0
South Tottenham	0	48
St. Ann's Road	1	6
Harringay Park	1	59
Crouch Hill	2	52
Hornsey Road	3	4
Upper Holloway	3	37
Junction Road	3	71
Highgate Road, (High Level) ..	4	25
Gospel Oak	4	46
Gospel Oak Junction with L.N.W.R.	4	60*
Branch to G.N.R. at Harringay	0	20*

* Approximate distances only.

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Locomotive and Train Working in the latter part of the 19th Century.

MIDLAND RAILWAY. [No. VII.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

IN October, 1888, the Midland authorities found themselves compelled to do something to meet the new competition between Bristol and Scotland. The Great Western had a train leaving Bristol at 9.30 a.m. which connected with the accelerated West Coast express at Crewe, and conveyed through coaches for Glasgow and Edinburgh. The Midland put on a new 9.35 a.m. train from Bristol, which stopped at Gloucester, with a running average between the two cities of 48¼ m.p.h., and after a stop at Cheltenham, ran the 87 miles thence to Derby in 2 hours. The speed of 43½ m.p.h. for this run included the stop at Bromsgrove and the ascent of the 1 in 37 Lickey incline. It cut out Birmingham altogether by taking the old route *via* Camp Hill, for had this express entered Birmingham there would have been an opportunity for the passengers to leave it for the London and North Western route. It reached Normanton, with one stop at Sheffield, at 2.23 p.m., and made a connection there with the 10.30 a.m. from St. Pancras to Glasgow, and at Leeds with the Edinburgh express. This was the best West of England express that the Midland had hitherto run. It was almost invariably worked from Bristol to Derby by the 6-ft. 6-in. 2–4–0 engines Nos. 1295 and 1296 belonging to Bristol.

These engines were of the Nos. 1282–1311 series, with 17½-in. by 26-in. cylinders, and were built by Dubs and Co. in 1876. They were splendid engines in their day, and No. 1295 (now No. 170) was one of the best of the lot. The following excellent run by engine No. 1295 on the new 9.35 a.m. from Bristol was timed by me in 1888, with a load of about 115 tons :—

		H. M. S.	
Cheltenham ..	dep.	10 54 25	(due 10.40)
Ashchurch ..	pass	11 2 35	
Abbott's Wood Junction ..	,,	11 15 30	
Bromsgrove ..	arr.	11 32 56	Stop for bank engine up 1 in 37.
	dep.	11 33 27	
Blackwell ..	pass	11 39 46	(dead slow)
King's Norton	,,	11 47 4	
Camp Hill ..	,,	11 51 39	
Saltley	,,	11 54 10	
Forge Mills ..	,,	12 1 17	
Whitacre Junct.	,,	12 2 45	(slack to 30 m.p.h. round curve)
Kingsbury ..	,,	12 6 17	
Tamworth ..	,,	12 11 49	
Burton ..	,,	12 24 39	
Willington ..	,,	12 29 22	
Derby, outside	stop	12 36 47	
	start	12 38 50	
Derby Station	arr.	12 39 44	(due 12.40)

No less than 16½ mins. of the time previously lost at Bristol and Gloucester were made up by the engine. The train had to make connections at Normanton and Leeds with the Scotch trains, for which it conveyed through carriages, and any late arrival at either of these stations would have delayed these most important expresses, hence the special spurt made to gain time. The time taken from passing Blackwell at the top of the Lickey incline at a speed of about 10 m.p.h. to the stop outside Derby Station, a distance of 53¼ miles, was 57 min. 1 sec., certainly the best running I have ever experienced on the Midland West of England route. The gradients were, of course, in favour of the engine, and fall practically the whole way from Blackwell. In regard to the large amount of time gained, it may be stated that the time-table allowance, giving a mean speed of 43½ m.p.h. from Cheltenham to Derby, including the Bromsgrove stop, was exceedingly generous, and had evidently been arranged in order to give an adequate margin in case of emergencies.

The London to Manchester services were also accelerated, and a very fine express —the 2 p.m. from St. Pancras—was put

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on. This was then the fastest train on the Midland, and took the long route *via* Nottingham and the Erewash Valley as far as Codnor Park, whence it cut through the loop line to Ambergate *via* Butterley. It was timed as follows :—

			p.m.	m.p.h.
	St. Pancras ..	dep.	2. 0	
72¼	Kettering	arr.	3.22	53
	"	dep.	3.26	
123¾	Nottingham ..	arr.	4.25	52.6
	"	dep.	4.30	
171	Miller's Dale ..	arr.	5.33	44.8
	"	dep.	5.34	
202¼	Manchester ..	arr.	6.20	40.75

29 at Nottingham. The next year, when they were followed by Nos. 30, 31 and 32, which went to Nottingham, Nos. 28 and 29 were removed to London. The new engines had double frames, 7-ft. 4-in. drivers, 18-in. by 26-in. cylinders, and 160 lb. pressure. The boilers had a heating surface of 1,240·6 sq. ft., of which the firebox provided 117 sq. ft. A minor innovation in Midland practice was the drumhead smokebox flush with the boiler barrel. To me this caused somewhat of astonishment, since the Great Western at Swindon, after building all engines for some years with these smokeboxes, had

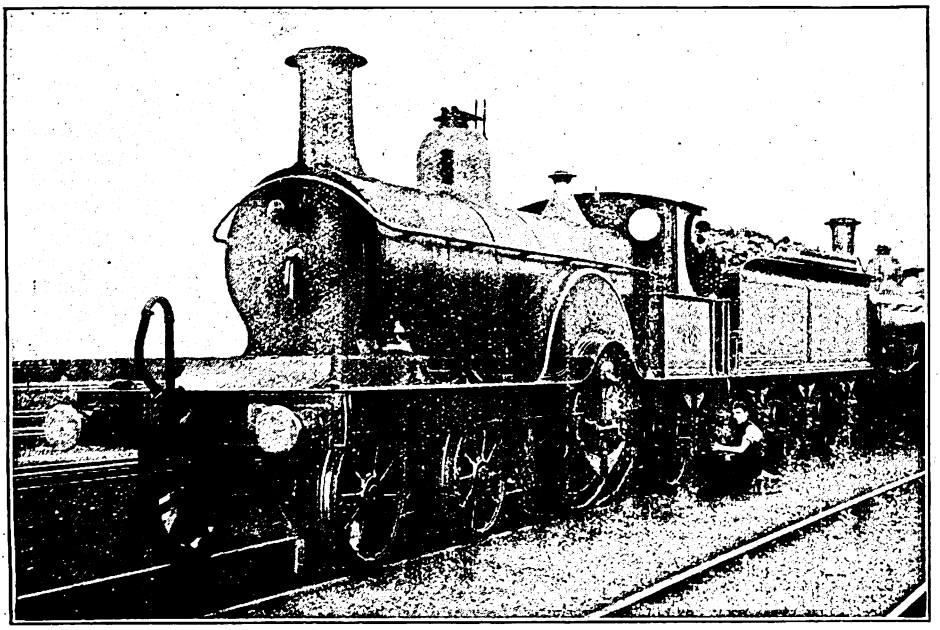

Photo.] [*Loco. Publishing Co., Ltd.*

No. 29. ONE OF THE FIRST FIVE 4-2-2 ENGINES.

Built by Mr. S. W. Johnson at Derby, 1887. Driving wheels 7 ft. 4 in. diam. cylinders 18 in. by 26 in. Steam pressure 160 lb. per sq. in.

In the meantime a new locomotive era had commenced on the Midland. One day in the autumn of 1887 I was at St. Pancras, when a slow train from the North came in headed by a new 4–2–2 single, No. 25, which was being worked up to London from Derby. This was the first single engine which had been constructed for the Midland for more than 21 years. There were five of them—Nos. 25, 26 and 27 stationed at Kentish Town, and Nos. 28 and just discarded them and reverted to the old form, with an angle ring raised above the boiler barrel. All the Midland "singles" and the majority of the 4–4–0 engines were built from this date with the new flush smokeboxes. In 1889 two more "singles" came out, Nos. 1853 and 34, with the driving wheels increased to 7 ft. 6 in. and the cylinders to 18½ in. by 26 in. Of these, No. 1853 went to the Paris Exhibition and gained a gold medal.

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From 1887 to the middle of 1893 no less than 60 of these fine engines were built, as follows :—

Year.	Original Nos.	Present Nos.	Wheels ft.	Wheels in.	Cylinders inches.
1887 ..	25–29 ..	600–604	7	4	18 ×26
1888 ..	30–32 ..	605–607	7	4	18 ×26
1889 ..	1853, 34 ..	608, 609	7	6	18½×26
1889 ..	1854–1857, 37, 1858–1861	610–618	7	4	18 ×26
1889 ..	1863–1865 ..	620–622	7	6	18½×26
1890 ..	1862 ..	619 ..	7	4	18 ×26
1890 ..	1866, 1867..	623, 624	7	6	18½×26
1891 ..	1868–1872	625–629	7	6	18½×26
1892 ..	8, 122, 20, 145, 24, 33, 35, 36, 38, 39, 4, 16, 17, 94, 97, 98, 99, 100, 129, 133	630–649	7	6	18½×26
1893 ..	149, 170–178	650–659	7	6	18½×26

The engines built to the end of 1890 had plate springs for the driving axleboxes, but those built subsequently, from No. 1868 onwards, had spiral springs.

All the earlier engines as far as No. 1860 were sent to London and Nottingham, but Nos. 1861 and 1862 went to Leicester. As the Cheshire Lines were considered to be a road eminently suitable for "single" engines, Nos. 1863 to 1866 were sent to Liverpool, to run the London expresses to Marple. Nos. 1867 to 1869 were at Nottingham, and Nos. 1871 and 1872 at Leicester, and when in 1892 it was decided to place "singles" on the Derby–Bristol road, the greater number of the 1892 built engines were sent to Bristol and Birmingham. Nos. 145 and 149 were quartered at Derby, but Nos. 170 to 178 all went to Leicester.

These engines gave excellent results and are undoubtedly amongst the most economical that have ever run. Their fuel consumption between London and Nottingham, with an average load of 115 tons, was only 20 to 21 lb. of Derbyshire coal per mile. But although these trains were very light, the road is undoubtedly heavy, and the speeds averaged 50 to 53 m.p.h. They were immense favourites with the drivers, amongst whom they were usually known as the "spinners." With loads up to 170 tons I have had some excellent runs behind them. Unfortunately they have had to give place on the best trains to the heavier and more powerful coupled engines, but during the 1912 coal strike they were all set to work again on the fastest trains, owing to their economical coal consumption.

The revival of "single" engines on the Midland after an interval of 21 years, during which none but coupled engines had been built, was due primarily to the invention of the steam-sanding apparatus on this line. This was due to Mr. Holt, works manager at Derby, and, when originally produced, the sand was blown on to the rails by compressed air supplied by the Westinghouse brake pump. To give the new invention a thorough testing, the coupling rods of some of the engines, Nos. 1306 to 1311, then (1886) stationed at Hellifield for working over the heavy gradients of the Settle and Carlisle line, were removed, and the engines worked as 6-ft. 6-in. "singles." The engines performed exceedingly well, except on one trip when sand ran short and considerable time was lost. But the Westinghouse Brake Company, whose relations with the Midland were at that time somewhat strained, did not approve of compressed air primarily intended for brake power being diverted for other purposes. Consequently the Midland turned their attention to the use of steam, with the result that the steam-sanding apparatus in universal use to-day was produced. Steam has also the additional advantage of cleaning grease off the rails.

The "single" express engine is now handicapped by the great weight of modern trains, but nevertheless in good weather is capable of giving an excellent account of itself, and is a much better engine than many of the coupled engine enthusiasts give it the credit for being. To give one case only, I may instance the former No. 770 class of the Great Eastern Railway, which the late Mr. Rous Marten generally found climbed the banks better than the coupled engines—No. 710 class—of exactly similar dimensions. But unfortunately in bad, slippery weather, the "single" engine takes so long in getting away with heavy trains that it cannot be relied upon in the same way as a coupled engine, and this is one of the principal causes of its disappearance on most railways.

A number of instances of the performances of the Midland "singles" were given in the RAILWAY MAGAZINE, Vol. 26, for

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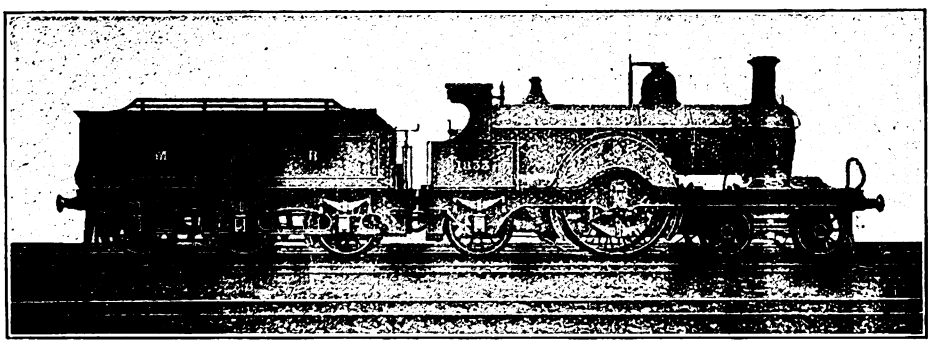
1910, by Mr. J. F. Vickery, so that it is not necessary for me to give many of my own experiences. Engine No. 171 ran a heavy Manchester express of 220 tons from Bedford to Leicester, 49½ miles, in 59 min. 10 sec. and gained 3 min. 50 sec. on the booked time of 63 min., in spite of the long and severe banks of 4 miles of 1 in 120 to Sharnbrook, 6½ miles of 1 in 132 and 1 in 160 to Desborough, and 2 miles of 1 in 132 to Kibworth.

In 1888 the Midland decided to pay greater attention to their Lancashire traffic with Scotland. Hitherto the Midland carriages from Manchester and Liverpool to Glasgow and Edinburgh had been taken in Lancashire and Yorkshire trains to Hellifield. An agreement was made between the two companies, which took practical effect on July 1, 1888, whereby the Midland worked these trains over the Lancashire and Yorkshire Railway with their own engines and carriages. As the Midland had no second-class coaches, a six-wheeled Lancashire and Yorkshire "second" was sandwiched into the Midland trains. At the same time the Scotch goods trains from Carlisle were worked through by Midland goods engines to Ancoats (Manchester) *via* Philips' Park Junction, and also to Liverpool.

A further extension of the Midland invasion of the Lancashire and Yorkshire territory came into being a short time afterwards, in the running of portions of the St. Pancras–Manchester trains from Marple through Ashburys and Miles Platting, to Manchester (Victoria), Bolton, and Blackburn. These trains were worked by Midland engines and rolling-stock, and initiated a very good service between London and the larger Lancashire towns.

For the Manchester and Liverpool to Hellifield traffic the Midland specially constructed the 15 4–4–0 engines, Nos. 1808 to 1822, at Derby. These may be regarded as the No. 1740 class, with the driving wheels reduced to 6 ft. 6 in. diam. The cylinders were 18 in. by 26 in. and the pressure was 160 lb. They were always excellent engines, but never had much chance on the Lancashire and Yorkshire road to show their mettle. From the Midland locomotive sheds at Belle Vue (Gorton) to the Lancashire and Yorkshire (Victoria) Station is 4½ miles, and to avoid light engine running, and also the congestion on certain portions of the route, an arrangement was made for the Midland to station engines Nos. 1808 to 1813 at Newton Heath (Lancashire and Yorkshire) shed. This held good for a number of years, but subsequently the Midland engines were removed to their own quarters at Belle Vue. In the same way Sandhills (Liverpool) shed of the Lancashire and Yorkshire was utilised for Midland engines Nos. 1814 to 1818, which usually ran between Liverpool (Exchange) and Blackburn, where the trains were joined to the portions from Manchester. These engines were, however, not retained at Liverpool for very long, and were replaced at Sandhills by a number of the old Kitson's bogie engines of 1876–77, the No. 1312 class, which, until the war, still



4-2-2 ENGINE, No. 1853.

Built at Derby and shown at the Paris Exhibition, 1889, where it obtained the Grand Prix. Designed by Mr. S. W. Johnson. Driving wheels 7 ft. 6 in. diam. Cylinders 18½ in. by 26 in. Steam pressure 160 lb. per sq. in.

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did the work from Sandhills. The remaining four engines, Nos. 1819 to 1822, were at Hellifield, and later two Midland engines of this class, were stabled at Over Darwen (Blackburn), to run to Marple.

The above engines were, however, not the only ones to run over this road, for the Carlisle men had one turn through to Manchester with Nos. 1572 to 1581, and Hellifield men also began to work some of the 2–4–0 engines of the No. 800 class. But the 2–4–0 engines had not a very long career on the Lancashire and Yorkshire road, and I was told at the time that the Lancashire and Yorkshire authorities insisted that only 4–4–0 engines should be used.

In 1891, 10 more of the No. 1808 class were built at Derby, with larger tenders. These were Nos. 80 to 87, 11 and 14, and the greater number of them were sent to Hellifield to work to Carlisle, Leeds and Manchester.

I have hitherto confined my reminiscences principally to the main line train services. The branch lines are not, perhaps, of so much interest, but a few notes may be devoted to them.

The Northampton line was worked by some of the old rebuilt Nos. 190 and 230 classes, originally Beyer Peacock's engines, and subsequently by Nos. 820 to 829. Midland goods trains at one time ran through from London to Gloucester *via* Olney, Stratford-on-Avon and Broom Junction, but it was stated at the time that the Midland engines proved too heavy for parts of the road on the East and West Junction Railway, and the latter company purchased three DX. goods engines from the London and North Western Railway to work these trains from Olney to Broom Junction.

I will pass over the Kettering to Cambridge branch, on which the service differed little from what it now is. Midland engine No. 239 was for a long time an inhabitant of the Great Eastern shed at Cambridge, and when it was "sent down" from the University one of the No. 1070 class replaced it, and was still there until recently At one time the Nottingham engines, Nos. 2, 5 and 12, had a turn through to Cambridge, but this has been discontinued for some years.

The service between Leicester and Peterborough has never included a real express. Until 1893–94 Peterborough was a more important Midland locomotive centre than it now is, for the Midland then worked the present Midland and Great Northern joint line between Peterborough and Lynn. The line from Sutton Bridge to Bourne was worked by the Great Northern engines, except that the Midland ran one or two cattle trains over it. There were at this time 10 passenger engines at Peterborough, the 2–4–0 engines Nos. 1070 to 1079, of which two—usually Nos. 1071 and 1073—were sub-stationed at Lynn. The Peterborough engines ran to Leicester, and with one turn they worked a train through to Birmingham, returning thence at 4.40 p.m. They also worked certain trains on the Lynn road. In 1914 there were only about five Peterborough passenger engines, which ran to Leicester. With one turn they went to Birmingham and with another to Burton. These turns were recently usually worked by two of the 4–2–2 "singles," Nos. 600 and 602 (formerly Nos. 25 and 27), which were stationed at Peterborough, but there are about three of the old No. 1070 class remaining there, with more than 40 years' continuous service at one shed. One of these, No. 1072 (now No. 129), used in the 'seventies to be a thorn in the flesh of the Great Northern main line drivers. The Midland line runs parallel to the Great Northern for a distance of about 6 miles, and, starting northwards from Peterborough, No. 1072 frequently showed the Great Northern express engines a clean pair of heels.

But for long service at one locomotive shed some of the Midland goods engines can give points and a beating to any locomotives with which I am acquainted. The Peterborough goods engines were Nos. 500 to 529, which were built in 1864–65 by Messrs. Stephenson. They went as new engines to Peterborough, and as Nos. 2416 to 2445 are still there, after more than 50 years; not one has been broken up. The longevity of the Midland double-framed goods engines is remarkable, and is due to two causes: in the first place, they were strongly built, with very solid frames; and secondly, they were thoroughly well looked after both by Mr. Kirtley and Mr. Johnson. There are some engines at Nottingham that can beat the record of those at Peterborough, and

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which have been there since they were built in 1860–61.

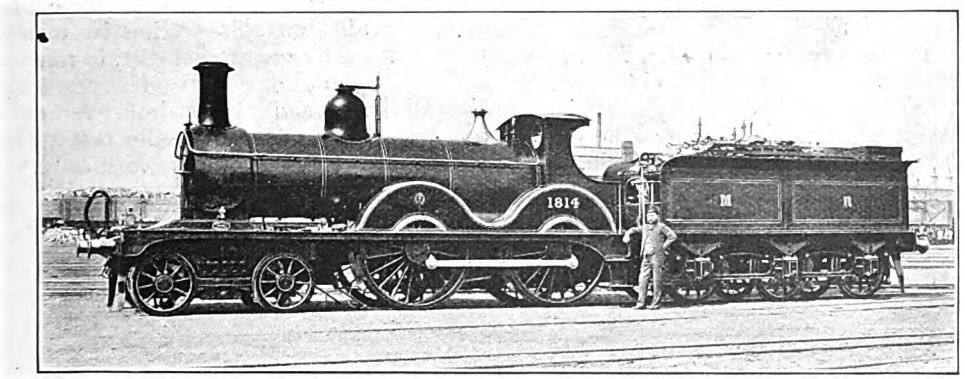
The Leicester–Birmingham section is a very important line, and is noteworthy in that, although the section from Wigston (Glen Parva) to Nuneaton Midland Junction belongs to the London and North Western Railway, the Midland run the greater number of trains over it. In the 'eighties the 2–2–2 "singles," Nos. 94 and 97 to 100, usually worked from the Birmingham end, though the coupled engines, No. 120 class, were also frequently to be seen. From the Leicester end all classes of 2–4–0 engines were employed. All the Midland trains were express from Nuneaton to Leicester, though most of them stopped at Hinckley. But the intermediate stations between Hinckley and Leicester were then, as now, served entirely by the London and North Western stopping trains from Nuneaton.

The Midland possesses running powers from Nuneaton to Coventry, and for a long time there was one solitary Midland goods engine, No. 658, which was stationed at Coventry. It found a home in a small "one-engine shed" at the end of the down platform of Coventry station, and may perhaps be described as one of the cleanest and smartest-looking goods engines on the Midland. The paint was spotless and the motion shone like silver. And this is saying a great deal, since all the Midland goods engines of that day were kept in beautiful condition.

Prior to about 1882 the Midland attempted a feeble competition for London–Birmingham passenger traffic, by running through carriages from St. Pancras, which were detached at Wigston Junction, sent round the south curve in charge of a small tank engine, and then attached to the Leicester–Birmingham trains. It was, however, a hopeless adventure, though it lasted for a good many years, and is now a thing of the past.

The Leicester and Burton line is not unlike the Manchester, Sheffield and Lincolnshire Railway main line between Manchester and Sheffield in its physical characteristics, for it resembles the roof of a house with the gable at Swannington. And if any reader likes to travel round the Swadlincote and Woodville loop he will enjoy one of the most remarkable switchback railway journeys in the kingdom, through stacks of large drainpipes, for the manufacture of which this district is celebrated. The Leicester–Burton line has always been worked from the Burton end by the 6-ft. 2-in. 2–4–0 engines of the old No. 156 class, formerly Nos. 102A to 109A, four of which are still—as Nos. 7, 8, 9 and 13—regularly to be seen on it. Leicester also provided 2–4–0 engines of various classes, and for some years the Rugby men worked one turn to Derby *via* Burton.

Rugby, however, is now a Midland "has been." For many years there were four passenger and ten goods engines allotted to the Rugby shed. The passenger engines were 2–2–2 "singles," which towards the close of the century



4-4-0 ENGINE, No 1814 (SERIES 1808—1822).

Built at Derby, 1888, for working Midland express trains over the Lancashire & Yorkshire Railway to Hellifield. Coupled wheels, 6 ft. 6 in. diam. Cylinders 18 in. by 26 in. Steam pressure, 160 lb. per sq. in.

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were replaced by Nos. 60 and 61, 2-4-0 engines of the rebuilt No. 800 class. When the present more intimate working arrangements with the London and North Western Railway came into being, Rugby was pensioned off as a Midland locomotive depôt, though the Midland still run passenger and goods trains with Leicester and Wigston engines.

Of the Nottingham and Lincoln line I have already said something in dealing with the Lincoln-Tamworth mail train. This line is one of the oldest on the Midland, and is remarkable in being almost dead level for the whole of the 33 mile distance, and is also nearly straight throughout. There are only two slight curves after passing the crossing one mile east of Nottingham, one of these being at Newark station. It may not be known to many of the readers of the RAILWAY MAGAZINE that at the point close to the Great Northern Newark Dyke Bridge, where the Midland line crosses the Great Northern main line at a level crossing, the signal box controlling this crossing belongs to the Midland, for the Lincoln line of the latter company existed before the Great Northern main line was made. But it is fair to the Midland to state that they give the Great Northern expresses the preference should two trains be signalled at the same time.

The Lincoln line would be an elysium for "single" engines, but now none are to be found on it. Until about 1895 nearly all the trains were worked by the old 2-2-2 singles stationed at Nottingham and Lincoln, but the later 4-2-2 singles, which would be excellent engines for this road, have never been allowed to run over it, owing to the existence of a small bridge or culvert somewhere on the route, for which the 17½ and 18 tons weight on the single drivers is too great. Apart from the Tamworth mail there were no express trains on this section in former years, with the exception of certain market trains on Fridays only, but a few years ago the Midland made great improvements, and there are now a few really fast trains run over it which stop at Newark only.*

* This refers to the year 1914, before the war.

(*To be continued.*)

Locomotive and Train Working in the Latter Part of the Nineteenth Century.

Railways already dealt with in the "Railway Magazine" by Mr. E. Ahrons are:—

L. & N.W.: Jan., Feb., March, May, 1915. (All out of print.)
GREAT NORTHERN: June, July, 1915. (Both out of print.)
MANCHESTER, SHEFFIELD & LINCOLNSHIRE: Aug., Sept., Oct., 1915. (Aug. and Oct. out of print.)
GREAT WESTERN: Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916. (Dec., Jan., Feb., June, July, and Aug. out of print.)
GLASGOW & S.W.: Sept., Oct., 1916. (Sept. out of print.)
GREAT EASTERN: July, Aug., Sept., Oct., Nov., Dec., 1918. (Dec. out of print.)
NORTH EASTERN: Nov., Dec., 1916. Jan., Feb., March, April, May, 1917. (Nov., Dec., 1916, Jan. and Feb., 1917, out of print.)
SOUTH EASTERN: June, July, Aug., 1917.
LANCASHIRE AND YORKSHIRE: Sept., Oct., Nov., 1917.
LONDON, CHATHAM & DOVER: Dec., 1917. Jan., Feb., 1918. (Jan. out of print.)
CALEDONIAN: March, April, May, June, 1918.
LONDON BRIGHTON & SOUTH COAST: Jan., Feb., March and April, 1919. (First three out of print.)
MIDLAND: May, June, July, Aug., Sept., Oct., 1919.

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NORTH STAFFORDSHIRE RAILWAY.

NEW GENERAL MANAGER.

MR. F. A. LOWRY BARNWELL,

General Manager and Engineer, North Staffordshire Railway.

TO succeed Mr. W. D. Phillipps as General Manager, the directors of the North Staffordshire Railway have selected Mr. F. A. Lowry Barnwell, the company's engineer. Only son of the Rev C. F. L. Barnwell, Vicar of Stramshall, Uttoxeter, he was educated at St. Chads, Denstone and Repton School. Mr. Barnwell became, in September, 1895, a pupil to the late Mr. G. J. Crosbie-Dawson, the then Chief Engineer of the North Staffordshire Railway. Under Mr. Crosbie-Dawson's direction he rapidly assimilated considerable engineering knowledge and experience, so that when the new railway from Leek to Waterhouses was put in hand he was appointed Resident Engineer. The line was opened for public traffic in 1904, and Mr. Barnwell remained in the district as Maintenance Engineer, and acted in a similar capacity on other sections of the North Staffordshire system. In 1907 Mr. Barnwell took over the entire management of the Cauldon Low Limestone Quarries, which work entailed the opening out of the new faces on the railway side of the hill. During his management the quarries were considerably enlarged, three stone crushers driven by gas suction plant were erected and brought into use; also an air compressor plant with which the whole of the drilling will eventually be done. The villagers in the immediate vicinity of the quarries have much to thank him for, as during his stay there a huge water tank was constructed, and pumping machinery installed, which provides all the machinery in the quarry with water as well as the villages of Cauldon, Waterhouses, Wardslow, &c. In March, 1912, he was recalled to Stoke to act as Chief Assistant to Mr. Dawson in the Permanent Way Department, in succession to the late Mr. John Bradbury. In April, 1914, was appointed Assistant Engineer, and in July, 1914, succeeded the late Mr. Crosbie-Dawson as Chief Engineer. He married, in July, 1906, Grace, second daughter of the late Colonel A. F. Laughton, C.B., late Bengal Staff Corps. Mr. Barnwell is a Member of the Institution of Civil Engineers, and Fellow of the Permanent Way Institution.

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From Taranto to London by Troop Train.

By A. H. POST.

WE were an impatient crowd that paraded in "full marching order" outside the modern army huts at Taranto in the dusk of a Friday evening.

We had been two whole days at this camp and, with the peculiar psychology of soldiers, it seemed to us our draft had been selected for the many odd fatigues that abound in all military camps. We were therefore eager, for many reasons, to be off; was it not the first home-coming after many years? And to those of us who had travelled out by the "overland" route, was it not likely to be the worst portion of our journey?

So we paraded just before 10 p.m. in the fading light and, after roll-call, broke up into groups, discussing whether we were to go *via* the east or west coast. At 11 o'clock we were marched to the train, a short description of which would not be amiss here.

To the continental traveller of pre-war days the truck marked "40 men or 8 horses (*en long*)" was a well-known feature, but a more intimate knowledge of the delights and comforts of travelling therein have since been gained by many. For the more fortunate innocents it may be explained that these trucks consist of a wooden platform on wheels without springs and a rough framework and roof of wood, with a large sliding door in each long side of the walls. On either side of the doors are two wooden flaps immediately under the eaves of the roof, which can be lowered for ventilation. When natives travel, two benches are placed back-to-back down the centre of the length of the truck, but no furniture at all was used in those in which these experiences were gained.

When the truck starts (there are no absorbing buffers), the walls and roof sway to an alarming degree, and, adorned with equipment strapped and hung at every available point, the situation is decidedly exciting.

There were about 45 of these trucks to our train, and in the centre a "W.D." hospital coach ready for emergencies. Next to that was a London and South Western Railway corridor coach for officers and warrant officers (two to a compartment). Further down was one truck set aside for storing and issuing rations, and next to that, the cooks' truck, fitted with four "Sawyer stoves" (portable boilers) for the preparation of tea for officers and men. There was a "dixie" for every truck, and after use they had to be returned clean and full of fresh water. Hot tea was served twice a day throughout the journey.

We were detailed off, 25 to a truck. In my party, one other man wished to be with a friend, and permission was given, so we were 26 in all. We scrambled up into the trucks (no mean feat) and started to rid our backs of equipment, disposing of it—each to his own best personal advantage—on the all too few projections round the sides and roof of the truck. A candle was lit and, by its flickering light, we managed to sort ourselves out and settle down. Two men were still without places round the sides, and were sitting dejectedly in the centre, each on his own equipment. Then a soldier went out and shortly returned with the welcome news that he had found accommodation elsewhere for himself and two more from our truck. Further sifting and shifting followed, and we were more comfortable.

Then we started bed-making, and this is where experience counts, for draughts of cold air have a nasty habit of finding their way into the truck when the train starts; the old campaigner provides against and overcomes these discomforts in various odd ways acquired under many varied circumstances.

However, half-an-hour afterwards all was quiet and one or two had even lapsed into slumber, when, with a sudden jolt, we were off and wide awake! With our ears almost next to the floor of the truck, and wedged as we were like sardines, the jolts and jars were very noticeable, and caused many scathing reflections on the Italian railways.

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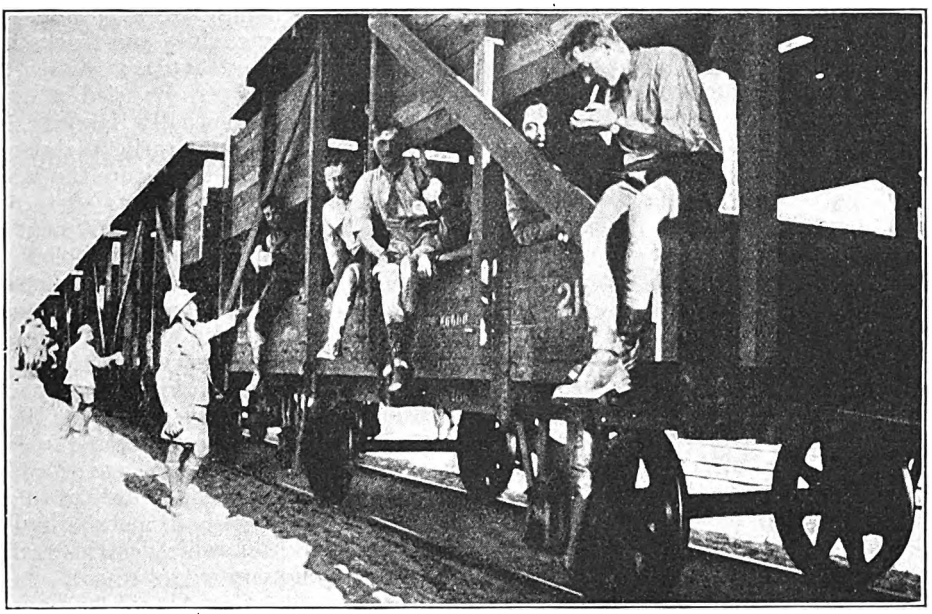
At 7.30 next morning we awoke to find the train stationary at Ostuni, but we had time only to draw our rations ere we were again on the move. We arrived at midday at Bari, where we halted for a wash, and after a welcome rest for two hours re-started, pulling up at Foggia Junction at 7 p.m.

We did not travel far this next night, for 7 o'clock in the morning found us only at Castellemare Adriatico, where we stayed for 3½ hours, which enabled us to stretch our limbs and enjoy a sea-bathe. Seven o'clock that evening found us at Ancona, and we were shunted off the main line at the station of Falconara, a short distance outside the main town, and connected thereto by trams. Here we were able to secure another bathe before leaving about 9 p.m.

We must have made good headway during this night, for next morning, by 7.30, we were stationary at Faenza, and I was told we had been there then at least an hour. Here we were marched to the British rest camp, 20 minutes' walk away, and provided with a hot breakfast. A plainly-spoken Scotch sergeant made known to us the rules of the place, promising us that letters from there would arrive home in 48 hours, and in two days from the hour of leaving, we ourselves would be home. (These fair words did not prove correct.) At midday, we had a hot dinner and were marched back to the train at 2 p.m., eager to be on the way once more, but thankful for the welcome break provided.

At 3.30 we left Faenza and reached Reggio at 9 p.m., passing Bologna about 6 o'clock, where a halt was made for tea. On awakening next morning we were still speeding along, and the atmosphere was decidedly cooler. We had, at 8 a.m., just passed Asti and, with only minor delays, continued to Torino, arriving at 12.30 p.m., where we had a welcome break of nearly 3 hours for breakfast, for which we were quite ready after an interval of 18 hours between meals.



WAR TIME RAILWAY TRAVELLING IN EGYPT AND PALESTINE.

Leaving Turin at 3.10 we reached Montecenisio at 7 o'clock, where our train was divided, and the interesting passage of the tunnel occupied all minds. Each section of our train had two electric engines to take it through the Mont Cenis Tunnel. We started at 7.55, and passed through several short tunnels and cuttings, ascending all the time, at a good speed. The villages and roads seemed to fall away quickly at first, but, after many curves, the sense of altitude was lost as

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the main valley gave place to side valleys. We stopped at two stations before reaching the main tunnel, which we entered at 9.23 p.m.; half an hour later, in gathering darkness, we drew up in French territory, but found it was even yet only 9.10 p.m.

The weather had now altered considerably. Rain had fallen intermittently after leaving Turin, and it had become very cold. We reached Chambéry next morning at 8.30 and, passing Aix les Bains, skirted the lake of Bourget, arriving at Lyons close on midday. Here we shunted back through St. Clair and the tunnel to St. Germain-au-Mont'Or, where we were supposed to stop for 3 hours, but as we were *sixteen* hours late, a half-hour's rest had to suffice. The weather still continued cold, and we seemed to be on a little-frequented line so, as I was fatigued through constant standing on my kit to peer through the aperture in the wall of the truck, I decided to sleep during the afternoon, and did not wake up until we reached Dijon at 6.30 p.m. We did not stop here, and no large place was passed that evening before dusk. We still kept going at a quick rate, and next morning found us at Malesherbes by 7.30. At 8.30 we departed, and arrived at Juvisy at 11 a.m., where we again pulled up on a siding. Here we stopped until 3.15 p.m.! Another troop-train arrived about 2 o'clock from Marseilles, containing men who left Egypt three days after us!

Leaving Juvisy, we travelled on the "girdle" line all round Paris, touching Versailles, St. Germain, &c., eventually arriving at Creil at 7 p.m. We stopped at this large junction about 2 hours, the sky still being grey and dull.

At 6 o'clock next morning we had passed Abbeville, and reached Etaples by 8.30, but we did not again stop until our rail journey ended at Boulogne at 10 a.m.

We had thus accomplished the distance from Taranto to Boulogne in one truck in 153½ hours!—compared with pre-war time of 48½ to 50 hours. The total rail distance from Taranto to Boulogne being about 1,430 miles, the all-over speed was only 9 miles per hour.

On reaching France the quantity of German rolling-stock was very noticeable. Trucks from all kingdoms of Germany, and each bearing its proud coat of arms and name, but through each sign was scrawled in white paint a cross and the name of the new owners plainly painted on.

A large number of U.S.A. high-power locomotives were in use on the French railways, and on the Nord line, several of our familiar home railways were represented by many engines and trucks under the control of our R.O.D.

Passing through the varied stages of demobilisation eventually landed us at Dover, where a comparatively short railway journey would constitute the last lap of our Army travels.

Here we were allotted eight men to a third-class compartment, and oh! what comfort—to sink in the well-upholstered seats, and lean our weary backs against cushioned partitions, and not to be so cramped! And when we started—not a jolt even, but a gradual easy sense of motion and gathering speed, just the low noise of well-oiled wheels running smoothly over substantially-laid rails, the marked absence of swaying, and, instead of noisy lurches as the lengths of metal slip away, just a faint knock which carries rather a pleasing monotony in its sound.

We departed from Dover at 3.30 p.m. and arrived at the London, Brighton and South Coast Crystal Palace Station at 6.10, our first stop being Chatham, thereafter pulling up at St. Mary Cray, Bickley and Norwood Junction.

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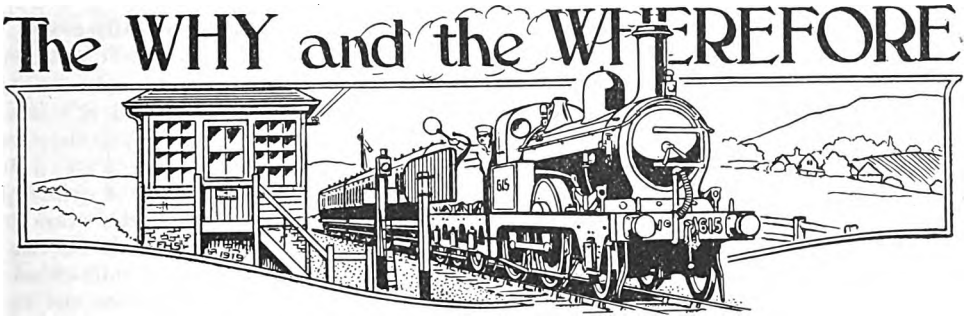
The WHY and the WHEREFORE



Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which, published in April, 1919, is out of print but a new one is in preparation, in readiness for publication in April, 1920.*

Birmingham & Gloucester Railway.

Mr. T. R. Perkins writes :—

The original route of the Birmingham and Gloucester Railway was via Dunhampstead, the city of Worcester being served by an omnibus service from Spetchley Station, four miles distant. A branch to Worcester was projected, but never constructed ; and when the "Oxford, Worcester and Wolverhampton Railway" made its line, the Midland—which had in the meantime absorbed the "Birmingham and Gloucester"—took the opportunity of securing access to Worcester over its metals. At the northern end a connecting line, 3 miles 71 chains in length, was constructed between Droitwich (O.W.W.R.) and Stoke Works (M.R.) ; at the southern end a similar link was built, 59 chains long, from Norton Junction (O.W.(O.W.W.) to Abbotswood Junction on the Midland ; both these were the property of the O.W.& W.R., and passed into the possession of the Great Western when that railway absorbed the West Midland, which had in its turn taken over the O.W. & W. The line via Dunhampstead was opened in 1840, and that via Worcester in 1850. For many years the whole of the Midland passenger traffic to and from the west was worked via Worcester, but since 1880 the chief expresses have travelled by the older and more direct Dunhampstead route.

Gloucester old station (Midland) was the terminus of the Birmingham and Gloucester Railway ; for some years the line thence to Bristol was in the hands of an independent company which made use of the Great Western line between Gloucester and Standish Junction, and when the Midland constructed an independent line between those points, it was not found practicable to carry it through the old station. In later days a new loop was built and the present through station constructed upon it.

[Reply to J. C. SEARLS.]

Tandem Compound Locomotives.

The 4-6-0 tandem compound tank locomotives built in 1905 for the Paris "Ceinture" Railway were claimed to possess many special advantages, but ideas concerning locomotive engineering practice witness many changes in the course of years. Since that date, superheating has materially altered the situation in regard to compounding, so that the latter practice has less to offer, though it may still be advantageous in combination with superheating. But the general policy now is to adopt superheating without compounding. Except when working compound there would be litttle point in using tandem cylinders. If more than two cylinders are to be used, whether simple or compound, it is generally considered best to utilise the mechanical and balancing advantages attending multiple cranks. There is not, indeed, very much value in the fact that tandem cylinders require only two sets of valve gear, for this applies

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also to four-cylinder designs, and can be done also with three cylinders, by means of rocking levers added to the gears.

[Reply to A. L. PELLING.]

"Shakespeare Route."

The railway which runs from Ravenstone Wood Junction, between Piddington and Olney, to Towcester Station, is a goods branch of the Stratford-upon-Avon and Midland Junction Railway; it was opened for goods traffic on July 1, 1891, and is now extensively used. It was used for passenger traffic from December 1, 1892, to March 30, 1893. It connects with the main line of the Stratford-upon-Avon and Midland Junction Railway at Towcester; this line runs from Blisworth (junction with London and North Western Railway) to Broom (junction with Midland Railway), passing through Towcester, Woodford (where there is a junction with the Great Central Railway), Fenny Compton, and Stratford-on-Avon, at both of which places there is a junction with the Great Western Railway, thence to Broom Junction. From the latter point, Birmingham on the north, and Evesham, Cheltenham, Gloucester, and Bristol on the west are within easy reach.

[Reply to "SILLEND."]

Signals at London Bridge, London, Brighton and South Coast Railway.

Distant signals are provided on the posts below the home signals admitting trains into platforms at London Bridge. The distant signals are provided to secure a warning when any vehicles are standing at the ends of the platform roads. Writing to the RAILWAY MAGAZINE on this subject a prominent member of the Railway Club remarks:—"In actual practice I have never known the distant signals pulled off, even when the roads are clear, and I have never met anyone who has. I have asked drivers who regularly work into London Bridge, and they have always told me that they have never known these signals to be lowered. No doubt the reason is that the ends of the platform roads are not in view from the signal box, and the signalmen cannot always keep track of stray vehicles left down there, and so the signals are always kept on as a safeguard."

[Reply to W. J. A.]

Great Western Railway Mile-posts.

Posts $\frac{201}{I}$, $\frac{201}{II}$ and $\frac{201}{III}$, which you have noted between Exminster and Starcross, are so lettered to indicate that they are respectively 201¼, 201½ and 201¾ miles from Paddington, *via* Bristol (the old main line), this being now the standard method on the Great Western Railway. The zero point of a series of mile-posts is seldom indicated on them, as in the case of lines radiating from London, the London terminal is always the starting point, while provincial mileage systems are usually calculated from their operating headquarters.

[Reply to G. L. SHADWELL.]

4-6-0 Express Engines, Caledonian Railway.

Nos. 49 and 50 are practically, though not exactly, similar to the "Cardean" 903–908 series, the former appearing about a year prior to the latter. Your description, "large-wheeled express passenger engines" would also doubtless apply to Mr. Pickersgill's new "60" class, with 6 ft. 1 in. wheels, and the 6 ft. 938–943 series purchased from the Highland Railway, but the two last-mentioned classes both have outside cylinders. The 5 ft. 9 in. inside-cylinder 4-6-0's not infrequently appear on express passenger service north of Glasgow.

[Reply to H. F.]

St. Pancras—Southend Expresses.

For many years there has been a standard service of four through trains between St. Pancras and Southend each way daily, with others during the holiday periods. These trains have always been scheduled fast between Barking and Leigh, unless one or two other calls are made, as in certain instances. Between St. Pancras and Barking, most of the intermediate stations are served, though some of the trains omit a few of them. There were also relief trains starting at Kentish Town, and boat expresses to Tilbury, to connect with the steamer services to Margate, Clacton-on-Sea, &c.

[Reply to "MIDLANDITE."]

2-8-0 Mineral Engines, Great Northern Railway.

Latest of these engines we have noted in service is No. 469, making a total of 14 (inclusive of the 3-cylinder engine, No. 461).

[Reply to J. PEARSE.]

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Swansea Avoiding Lines.

These provide an alternative route for main line trains from Court Sart Junction *via* the Neath loop and the Rhondda and Swansea Bay Railway to Lon-las Junction, where connection can also be had with the old line at Skewen Junction, and thence *via* Felin Fran, Llangyfelach, Pont-lliw, Morlais Junctions, Llangennech and Bynea to Llandilo Junction and Llanelly. A direct line from Morlais Junction to Pembrey is also authorised.

[Reply to F. PERMAN.]

Somerset and Dorset Joint Railway.

Midland Railway locomotives have been lent to this company on various occasions, and the Derby authorities are, of course, responsible for the design and construction of Somerset and Dorset Joint Railway engines, but it is not customary for Midland engines in ordinary circumstances, to work through with Midland trains over the Somerset and Dorset Joint Railway.

[Reply to R. S. ELLIS.]

Cannon Street Station.

Trains which serve both Cannon Street and Charing Cross, South Eastern and Chatham Railway, require an engine to be attached at the rear after entering Cannon Street Station to continue the journey. Any convenient engine is therefore used between the two stations, the main line locomotive taking the train only from or to Cannon Street.

[Reply to "LONDON BRIDGE."]

Heating Surface.

We have previously explained that heating surface does not necessarily indicate the relative power, or even the steaming capacity of an engine. Different locomotive superintendents hold different views as to the extent to which a boiler should be crowded with fire-tubes, and to this must be attributed the differences to which you refer.

[Reply to H. F.]

4-4-0 Engines, South Eastern and Chatham Railway.

There are no 4-4-0 engines on the South Eastern and Chatham Railway built to the designs of Mr. R. E. L. Maunsell, the present locomotive superintendent, but the 772–793 large-boilered series, to which probably you refer, although designed by Mr. Wainwright, were completed under Mr. Maunsell's supervision.

[Reply to CECIL T. WOOD.]

4-6-0 Mixed-Traffic Locomotives.

The 4-6-0 engines to which you refer were not designed, we believe, for high-speed express passenger work (as witness their colour), but in their own sphere of operating passenger and express goods trains over heavily-graded sections, they may doubtless be reckoned as successful machines.

[Reply to "HIGHLAND."]

Scottish Rail Lengths.

On the main line of the Caledonian Railway the lengths principally in use are 32 ft. and 48 ft., while the North British Railway has considerable lengths of 24 ft., 30 ft., 40 ft., and 48 ft. rails on the main lines, and in the latter case rail-joint speed estimation presents many pitfalls.

[Reply to J. M. GIBB.]

Hull and Barnsley Engines on the South Eastern and Chatham Railway.

At a time of locomotive shortage on the South Eastern and Chatham Railway, immediately prior to the war the engines mentioned by you were loaned by the Hull and Barnsley Railway to the former company, by whom they are still employed.

[Reply to MERVYN LONGHURST.]

"At Full Steam."

It is not unusual for engines to work with the regulator fully open, but it is highly improbable that the engines you noticed were running in full gear, as, except at the very lowest speeds, it would be impossible for the boiler to supply steam rapidly enough in these conditions.

[Reply to "HIGHLAND."]

Shropshire and Montgomeryshire Light Railway.

This line runs from Shrewsbury to Llanymynech and Criggion, and has a length of 26 miles, 6 locomotives, 12 passenger train vehicles, and 35 goods vehicles. You can obtain these and similar particulars from the Railway Year Book.

[Reply to E. E. C.]

White Diamonds on Signal Posts.

Fixed on the posts just below the arms these indicate that the section of track concerned is protected by track circuit, and therefore the fireman and guard of a goods train need not proceed to the signal-box to keep the signalman reminded that the line is occupied by the waiting train.

[Reply to E. E. C.]

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R.O.D. 2-8-0 Locomotives.

We are not aware that any of these engines are being added by the South Eastern and Chatham Railway to their own stock, but as many are passing through their hands for distribution it may be that a few are being utilised where practicable, or are being tested.

[Reply to "LONDON BRIDGE."]

Great Northern Railway Coaches at Holyhead.

Probably the long train of Great Northern Railway 6-wheeled coaches seen by you on the North Wales main line of the London & North Western Railway had been or was being used for military or other special transport.

[Reply to A. L. PELLING].

Great Western Railway "Stars" *v.* London and North Western Railway "Claughtons."

Loads hauled by these engines vary entirely according to the grading of the route traversed, and it is not possible to lay down any basis of comparison.

[Reply to R. S. ELLIS.]

Catch-Points.

"Runaway" and "catch" points usually have one and the same function, *i.e.*, they are arranged trailing to a running line—in order to throw off any train running away in the wrong direction.

[Reply to J. M. GIBB.]

Great Western Railway Suburban Trains from Victoria.

We cannot say whether the service of Great Western Railway trains between Victoria and Southall or beyond will be re-introduced.

[Reply to W. J. A.]

Disused Passenger Stations — Midland Railway.

Stations you refer to are those at Harlesden and Dudding Hill, on the Midland line from Acton to Brent Sidings and Cricklewood.

[Reply to E. C. B. THORNTON.]

Rebuilt 4-6-0 Engine, London and North Western Railway.

There is one rebuilt 4-6-0 engine of the original inside cylinder "Experiment" class, *e.g.*, No. 1361, *Prospero*, which has been altered to a superheated 4-cylinder engine on the Dendy-Marshall system.

[Reply to THOMAS C. ORFORD.]

G.W.R. Electrification.

We know of no proposals for electrification of Great Western lines in the London district, except in regard to the extension from the Central London Railway to Ealing.

[Reply to E. C. B. THORNTON.]

Twyford Station, Great Western Railway.

At the time of writing, a temporary service slack through this station is in force, owing to a slip in the bank on the down side of the line.

[Reply to J. PEARSE.]

Little Salkeld Derailment, Midland Railway.

4-4-0 compound No. 1010, which was involved in this accident, was not seriously damaged, and is now again at work.

[Reply to PATRICK TARRAN.]

G.W.R. Locomotives Overseas.

The only locomotives of this railway sent overseas not strictly goods were the 2-6-0 mixed-traffic class, of which a number were used in France.

[Reply to "COUNTY OF CARMARTHEN."]

Great Central Railway 4-Cylinder 4-6-0 "Lord Faringdon."

This engine works regularly to and from Marylebone.

[Reply to PATRICK TARRAN.]

Box Tunnel, Great Western Railway.

Length is 3,212 yards. For further particulars see page 264, RAILWAY MAGAZINE, April, 1919.

[Reply to ALBERT V. GILES.]

Largest Railway Terminus in London.

Waterloo is the largest terminus in London. It has 21 platforms. See page 64, RAILWAY YEAR BOOK, 1919.

[Reply to C. J. M.]

Caledonian Goods Engines.

Goods engines on this railway are painted black.

[Reply to H. F.]

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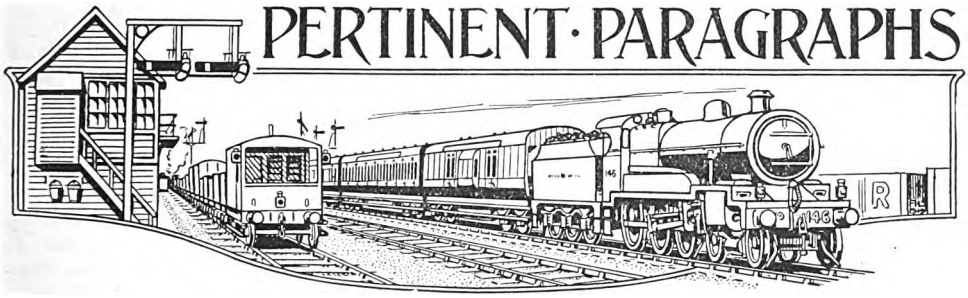

The Nine Days' Railway Strike.

As RAILWAY MAGAZINE readers are well aware, since the publication of our October issue the greatest railway strike in British history has taken place. The call to the railwaymen to cease work took place with startling suddenness on Friday, September 26, and the struggle came to a dramatic close on Sunday, October 5. At the beginning of the conflict neither the public nor the railwaymen possessed any clear idea of what the trouble was about, but the people, as a whole, quickly concluded that an attack was being made upon them by the workers in the railway industry, and the way in which the public rallied to the support of the Government was no less surprising than the solidarity of the railway workers' response to the strike order issued by the National Union.

There is no need here to recapitulate the charges brought against the Government by the National Union of Railwaymen. Our readers are already acquainted with them by the records in the daily press. Let it suffice that the Government lost no time in advertising that there was no intention of reducing the pay of any railwayman, and neither did they intend embarking upon the policy of attacking such a deeply-rooted institution in national life as trades unionism.

As will be shown in succeeding paragraphs, solid as was the response to the strike order, men began to return to work on the railways on the first day of the strike, and these, with volunteers from outside the service, were increasing in volume day by day. As a consequence, train services were being instituted all over the country, while London and the big centres of industry were efficiently provided with road-motor-borne foodstuffs under Government supervision.

To the welcome relief of all concerned, a compromise was effected on Sunday, October 5, and although, in principle, there was no alteration of the position as it was when the strike was precipitated, sufficient was conceded by the Government to enable the trade union leaders to call their men back to duty.

The Settlement.

THE settlement made no definite provision to meet what was supposed to be one of the main reasons for the strike, *i.e.*, a minimum standard basic rate for the lowest grades. It will be remembered that the Government offered 40s. per week, which was definitely declined by the unions. It was conceded that the present level of wages shall be guaranteed up to September 30, 1920, that is nine months longer than the first offer and six months longer than the subsequent offer made by the Government. The concession can only be of value to the men if the cost of living becomes less than 110 per cent. above pre-war level before September 30, 1920, as if this did not happen there was no intention on the part of the Government to make any reduction in the war wage.

One clause in the settlement, establishing a minimum of 51s. per week (including war wage) so long as the cost of living is not less than 110 per cent. above pre-war level, will mean an increase of 2s. or 1s. to a comparatively small number of men, mainly platform porters, whose pre-war rate was 16s. or 17s., as follows :—

	s.	d.	s.	d.
Pre-war rate	16	0	17	0
War wage	33	0	33	0
Total before settlement ..	49	0	50	0
Increase after settlement	2	0	1	0
Total minimum rate ..	51	0	51	0

It will be seen that the only real advance on the previous offers of the Government is the increase of 1s. or 2s. to the lowest paid men, with the possibility presumably that the 40s. basic rate may be increased during the further negotiations, and the small concessions gained seem out of all proportion to the general dislocation, expense and loss occasioned by the strike. So far as the RAILWAY MAGAZINE is concerned we claim to be second to none in our sympathy with all legitimate claims of railwaymen for a share in the better world that is supposed

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to be in the making, as a result of the war, but we feel on this occasion railway workers were badly served by the leaders who precipitated a strike without first making sure that they had a case that would command the support of the general public.

Train Service Developments.

IN regard to working during the strike, inevitably very little could be done on Saturday, September 27, to meet the situation, but certain lines operated a fair number of trains. The only London electric service in operation was the Metropolitan, where traffic was never entirely discontinued. Several lines began to organise emergency services, and in some instances practice trains were operated by loyal men and volunteers, both on the Saturday and on Sunday, September 28, though regular trains on the latter day were practically nil. Commencing Monday, September 29, measures for working emergency trains began to take definite shape, and that day about 600 trains were run. On Tuesday the number rose to approximately 1,000; on Wednesday that total was doubled; on Thursday the figure rose to about 2,600, and on Friday to nearly 3,500. On Saturday nearly 4,000 trains were available. These figures are exclusive of trains on the London tube and underground railways. It will, therefore, be seen that the railways had realised very creditable development during the critical week. Furthermore, goods trains had been steadily increasing from day to day, so that the prospects for the following week, had the situation not been relieved, were distinctly favourable from a national point of view.

While on this phase we may set forth a few facts concerning the numbers of trains operated day by day on various lines.

Great Western Railway.—September 27, 54; September 28, 32; September 29, 191; September 30, 244; October 1, 325; October 2, 394; October 3, 457; October 4, 568; October 6, 99; Total, 2,364 passenger, milk and perishable trains.

London and South Western Railway.—September 27, 16; September 28, 24; September 29, 112; September 30, 123; October 1, 164; October 2, 198; October 3, 269; October 4, 269; October 5, 7. This gives a total of 1,182 passenger trains; in addition, 28 milk and goods trains were operated.

South Eastern and Chatham Railway.—1,125 passenger trains and 302 goods trains run; total, 1,427.

Great Eastern Railway.—September 29, 179; September 30, 228; October 1, 250; October 2, 298; October 3, 320; October 4, 252 (reduced owing to fog in early morning); October 5, 75. In addition, numbers of goods trains operated each day were respectively 1, 14, 4, 7, 5, 6 and 9.

Great Central Railway.—September 27, 6 passenger trains, increasing to 30 on October 3, and 56 on October 4. In addition, hourly services were given on the Grimsby and Immingham Light Railway, and towards the end of the week some 20 to 30 goods trains were being run.

London and North Western Railway.—September 27, 29 trains; September 28, 13; September 29, 80; September 30, 125; October 1, 237; October 2, 299; October 3, 340; October 4, 348.

Midland Railway.—By the middle of the week nearly the whole of the system was provided with a train service. On Saturday, October 4, 266 passenger trains and upwards of 100 freight trains were run.

London, Brighton and South Coast Railway.—Passenger and goods trains: September 30, 297; October 1, 342; October 2, 352; October 3, 381; October 4, 413.

North Eastern Railway.—Passenger trains: September 27, 5; September 28, 7; September 29, 35; September 30, 64; October 1, 76; October 2, 86; October 3, 105; October 4, 124; October 5, 2. Freight trains numbered: September 30, 10; October 1, 10; October 2, 43; October 3, 56; October 4, 60; October 5, 9.

Lancashire and Yorkshire Railway.—232 passenger trains were operated September 27 to October 5 inclusive.

Caledonian Railway.—September 27, 63 passenger and 65 freight trains operated. On October 4 there were 126 passenger and 345 freight trains. Total, September 27–October 5, 501 passenger and 1,665 freight trains.

North British Railway.—On September 27, 40 trains, chiefly passenger, were run; and on October 4, 176 passenger and 72 goods train workings were in operation. Total, September 27–October 5, 772 passenger and 375 goods trains.

Strike Traffic Working.

DURING the first few days of the strike, train running under signal control had to be almost entirely discontinued, traffic being operated under the time-interval system, signals being treated as non-existent for the time. On all lines cabins adapted for switching-out were so treated and on the Great Eastern Railway the additional step was taken of electrically disconnecting certain cabins and re-connecting as required, to form temporary long sections. In the event this measure caused delay in restoring normal working, but had the strike continued the action taken would have been fully justified by results. Certain treadles and devices were also cut out for the time. As

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the week proceeded, more and more cabins were brought into use, and eventually those at nearly all vital traffic points were manned; inspectors, loyal men and others qualified taking the more complicated boxes, while volunteers operated others, some of them qualifying for comparative responsibility in the course of a few days. In many instances points were maintained in particular positions, so as to provide definite traffic routes which were not varied, except under expert supervision, and for occasional special traffic movements. In fact, in large measure, train working on suburban routes was so allocated that respective services had each a track route which avoided association with any other service, point movements being confined to the termini and here and there, but not at all in many instances at intermediate junctions. A railway having fast and slow lines generally restricted its traffic routes to two—one confined to each set of roads, conflicting and complicating services being discontinued. By this means, signalling was considerably simplified; but even with this advantage many of the volunteer signalmen operated relatively heavy services, though of a non-conflicting character. Indeed, by keeping traffic routes distinct as far as possible, comparatively heavy services could be operated, even with time-interval working without signals. Several lines having signalling schools were able to produce sufficiently qualified men at short notice, especially as there were many partially experienced men among the clerical and other staffs, while officers from colonial and other lines, on leave here, and some men who had had signalling experience in the Army rendered valuable assistance.

As a rule, traffic was not operated after dark, except that a fair number of trains necessarily finished their journeys in darkness. The great difficulty was goods working, as this required point operation in certain places; but from day to day the numbers of such trains worked was steadily growing. Milk and perishables were conveyed in large quantities, both by ordinary trains and by specials. Station staffs also included many volunteers, in charge of level crossings, as porters and ticket-collectors, and there were many amateur guards. Goods station porters included volunteers also, and railway stables were well looked after, women helpers, in several cases, rendering special service. Railway-owned road motors, both passenger and goods, were, of course, fully utilised, and, in numerous instances, private road services provided facilities in connection with trains, even for places normally connected by rail.

Volunteer enginemen rendered great assistance on many lines, though some companies were able to provide sufficient men for this work from their own staffs. At Liverpool Street there was an enginemen's training school, and a considerable number of recruits for this work were obtained, mainly as firemen, though many were promoted to driving after a few days.

Reports from the Railways

On the Great Western Railway about 8,000 public volunteers offered their services, and about half that number were employed. There were also about 2,500 volunteers from the Army, Navy, and Royal Air Force, and 1,000 from the staff and superannuitants. On this line no fewer than 38 shunting engines were at work on October 4, a remarkable total. Block signalling was eventually operated from Paddington to Weymouth, Taunton (*via* Bristol and *via* Westbury), and to Birmingham, besides long stretches of line elsewhere.

On the London and South Western Railway a system of train control was instituted between Waterloo and Southampton, with 14 sections, and this was also extended to the Windsor line. Under this system fixed signals were generally disregarded, except at certain junction points, trains being flagged at the boxes in use. Army, Navy and Air Force volunteers on the South Eastern and Chatham Railway numbered 1,065, and large numbers of the general public also rendered assistance.

About 2,000 voluntary workers were taken on by the Great Eastern Railway, for platform duty, as enginemen and guards, with a few shunters, while the commercial department utilised many for duties other than traffic in the goods depôts. About 150 men passed through the signalling school, of whom 15 were given charge of cabins, though a large number of others were assisting, to obtain experience, ready to accept responsibility themselves. In the London area the Loughton, Ilford, Chingford and Enfield routes eventually had trains about every 20 min., while every important main and branch route on the system was served to some extent.

Great Central Railway trains operated between London and Manchester, and from Liverpool to Grimsby, while the Grimsby and Immingham Light Railway was given an hourly service. Fish traffic was carried from Grimsby to Sheffield for transfer to trains for Manchester and London. About 700 volunteers actually worked, but large numbers in addition were available. About 2,500 members of the public assisted on the London and North Western Railway. Traffic was largely operated under the "control" system. The London area had a number of

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trains, and between Broad Street and Willesden there was a regular service, while most of the main lines and many branches had at least a few trains.

"Control" working on the Midland Railway proved exceptionally valuable, and on this line special attention was given to serving collieries and large industrial establishments. On the Great Northern Railway, skeleton services were early introduced on main routes. During the last three days of the week some 3,000 tons of potatoes were brought to London from Boston and Spalding, seven trains being run for this traffic alone.

The London, Brighton and South Coast main line to Brighton was kept open throughout, controlled by a number of central signalling stations. Brighton, Polegate and Horsham were constituted distributing traffic centres for branch services. About 800 volunteers were taken on at headquarters, and others locally. On the North Eastern Railway, "Control" working was employed, and services were provided on most principal routes. Special arrangements were made for getting perishables, foodstuffs and live stock on the line when the strike commenced, into position for delivery, and the bulk of this traffic was soon disposed of.

On the Lancashire and Yorkshire Railway about 400 volunteers were engaged for essential duties. The Manchester–Bury electric service was working. On the goods side, public utility works and industrial centres were supplied with coal, and the needs of collieries in regard to wagons were well met.

In Scotland the Caledonian Railway enrolled some 1,300 volunteers. On the first day of the strike 63 passenger and 65 freight trains were run, while, on October 4, the figures were 126 and 345. Out of 617 signal boxes 172 were manned on the first day, and on the last day of the strike 325 were working. Speed was reduced to a standard of 20 m.p.h., whilst special modifications of operating arrangements were introduced to assist volunteers and loyal men. The North British Railway employed about 1,000 volunteers.

A "Metropolitan" Record.

WHILE the strike was the cause of bringing many of the railways to a complete standstill, the Metropolitan Railway was able to run a service from an early hour on Saturday morning, September 27, and this was steadily increased until a service had been put in operation on all branches of the system. The power house at Neasden was in commission during the whole of the strike. It was manned by 70 volunteers, who carried out their work for long hours under great difficulties, and it was mainly owing to their efforts that the public using the Metropolitan Railway suffered a minimum of inconvenience, and that a frequent service was maintained. A 20-min. service was run from early in the week, and this was subsequently improved to a 15-min. service. On September 30 a motor lorry service was commenced between Chorley Wood, Rickmansworth, Northwood and Harrow, in order to convey passengers from the outlying districts of the Metropolitan system to join at Harrow the service of electric trains to Baker Street. These motor lorries, which ran at intervals of approximately 15 min., proved a great boon to season ticket holders and others, and were filled to overflowing both morning and evening, and extra trips were oftentimes necessary. Thousands of passengers who would otherwise have been stranded or very considerably delayed were conveyed by this means. Mails and newspapers were also conveyed daily throughout the strike from London to the principal towns and villages served by the company in Middlesex, Herts and Bucks. 1,300 volunteers presented themselves to carry on the good cause, and approximately 300 worked in some capacity. Many well-known people came forward to help, amongst them being many prominent persons.

London Electric and Underground Railways.

The London underground group of railways first required volunteer labour to assist at the Lots Road power station. At the same time, men from all walks of life were taken on as volunteer workers for service at stations, and as motormen, guards and gatemen on trains. Altogether nearly 4,000 were enrolled for service, of which a considerable proportion were taken on. Eventually Mr. H. E. Blain notified the public that he had enough offers of assistance for possible use. The volunteer staff taken on were accommodated in hostels, utilising portions of various railway institutes and other suitable places. Traffic was restricted entirely to straightforward routes, no junction working being done, except that on Friday both sections of the Hampstead route of the London Electric Railway were brought into use, involving the Camden Town junctions. On Tuesday, trains worked between Mansion House and Hammersmith, the stations open being Charing Cross and Victoria only. Later, Westminster, Sloane Square and Earl's Court were brought into use, whilst the service was extended eastwards to Aldgate East and westwards to Ealing Common. The Hampstead Tube and the Central London Railway were brought into use on Wednesday, and on Tuesday the Piccadilly

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route opened. The " Bakerloo " was added on Saturday. On Monday, October 6, measures had been taken to re-open part of the City and South London line, but with the return of the staff substantially normal working could be adopted. On that day the strike services were continued on most routes, though the staff had returned, the only difference being that running was maintained until the usual times for last

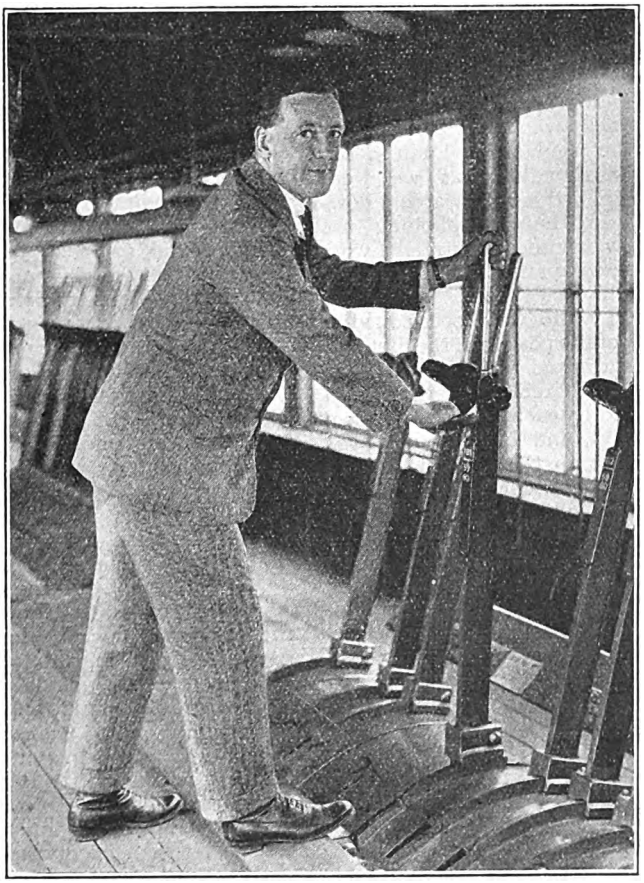

Photo.] [*Topical.*

MAJOR SANDYS (DIVISIONAL TRAFFIC SUPERINTENDENT, SUDAN GOVERNMENT RAILWAYS) IN SIGNAL BOX AT WATFORD, LONDON & NORTH WESTERN RAILWAY.

trains. On Tuesday, October 7, traffic was substantially normal on all sections.

A principal operating obstacle during the strike period was the lack of signalmen on the main lines, which necessitated the switching out of boxes and curtailed traffic movements after nightfall. On the London tubes and other underground railways, however, the margin of safety was in no way decreased by the very short period of training given the improvised staffs, since the installation of automatic signalling devices is general on the London electric railways.

Strike Experiences of a Volunteer Signalman.

THE pertinacious enquiry of the man in the next box as to whether the line is clear for " ordinary passenger train " is one which will pursue me (writes Cecil J. Allen) in my waking and sleeping hours for some time to come. My meals in the box were what is described in the ecclesiastical calendar as " movable feasts "; almost every moment that " ting, ting, ting——ting " would interrupt the consumption of my necessary food, and demand a reply. For every train was an

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ordinary passenger," whether it were passenger, goods, "coaches," or a light engine, which sounds Irish; but the Great Eastern authorities had wisely simplified the signalling code for the benefit of such raw amateurs as myself and others. So "Is line clear?" "Train on," "Train out," the cancelling signal and the "obstruction danger" signal were all we had to contend with. On one occasion, before we had received these definite instructions, the passage of a train without a tail-light occasioned a frenzied dash to the "Sykes' Lock and Block" rules, where we ascertained that we must give nine rings consecutively to the box in advance and 5—4 to the box in rear; result, a correct acknowledgment from the latter, whereas the regular signalman in the former evidently thought that we were wool-gathering. Shortly afterwards, however, we overheard him telephoning the terminus to know whether this really were the case, and receiving an affirmative reply; whereat, justifiably, we felt "one up." The telephones, by the way, occasioned a perpetual breach of the peace; in the first box to which I was drafted we were on four circuits, and as each circuit comprised from 6 to 12 boxes, and as each box had its own code for ringing up, and as every ring was heard in every box on that circuit, and as each ring was acknowledged by a corresponding ring, the result may be imagined!

East London Junction Box.

East London Junction was my first charge. It was a simple place to work, as the junction, of course, was not being operated, nor any distant signals, so that we had only two signals on the down "through" line and one on the up "through" to pull over. Its peculiarity was that, as it is not intended at any time to stop main line trains at the East London signals, it was necessary to get "clear" from the box in advance and pull off the signals before one could plunge "clear" on the instruments to the box in rear. Here, on the third day, I had the company of one of our splendid non-service volunteers —a major who had held a very responsible position at general headquarters throughout the war—and it was but a brief space before he too was a perfectly competent signalman. Curiously enough, a train was stopped the next day on the "local" line, immediately opposite our box, and whom should he espy on the footplate, acquiring a mastery of the rudiments of firing, but a boon companion from the Air Ministry! Joyful greetings followed on our megaphone. There were other companions in the box also, especially in the early mornings. As this cabin is recessed under an arch in the retaining wall, there is no room for the usual outside staircase, and one has to enter through the "works," up a ladder, and then through a trap door. One morning, in the half light of early dawn—our hours, by the way, were the modest ones of 6 a.m. to 7 p.m. —my companion, proceeding cheerfully up the ladder, was greeted at the summit thereof by a rat about the size of a small rabbit. The next morning there were two. The next night we kept the trap-door shut!

From "Strike" to Normal.

On the conclusion of peace our work was by no means done. So enormous was the volunteer organisation built up by the Great Eastern Railway, and so extensive had been the measures of disconnecting important electric appliances, in order to simplify the working generally, that it was essential that the volunteers should carry on until a clean break could be made between strike working and ordinary working. This was fixed for the Tuesday night. Some of our volunteers, however, were anxious to get away, and so I was next detailed to relieve, single-handed, the colonel and the captain who were together working Middle Box, at the foot of Bethnal Green bank. These were indeed "crowded hours of glorious life." Middle Box signals four roads—up and down suburban and up and down local—and in these culminating days of the strike service we had worked up to about 200 trains a day on these lines, let alone those working on the through lines. To have four trains "offered" at one and the same time arouses resentment rather than gratitude, but despite the somewhat majestic feeling that accompanies the holding up of a train-load of passengers until it is one's will and pleasure to lower the signal and allow them to proceed, only three trains were in reality so brought to a stand, and the responsibility for that rested with "Bishopsgate South," which had not freed my "starter," the line not being clear into the next section. In the excitement of the moment I must confess I did accept one train on the "suburban" that had been offered to me on the "local," and had to use Mr. Sykes' special key in order to correct my instrument, but as the regular signalman at Bethnal Green West did precisely the same with a train I offered him about an hour later, I was comforted exceedingly. The only other occasions when it became necessary to employ Sykes' key were the cancellation by the boxes on either side of trains which I had accepted and "pulled off" for, owing to their having shunted back or been otherwise disposed of. To free the backlock of my signal lever, in order to put it to danger, the key had then to be used, and, incidentally, the completion of an electric circuit between key and lever

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via my carcase afforded me a most satisfying experience of the power of the current employed.

In this box was to be found a most fearsome piece of apparatus, known as a " train describer," whereby the character and place of origin of each up train is duly signalled through to Liverpool Street; had it been necessary to add this to my other duties, I fear I should have been compelled to strike also, but fortunately this did not eventuate. Ordinary telephone messages were quite bad enough, as they always appeared to coincide with the arrival of trains from all directions, to my considerable distraction. However, " all's well that ends well," and so, with no further disaster than the explosion of my " emergency detonators " by light engines returning to the temporary locomotive " park " at Liverpool Street, after the last passenger train had passed and the box was closed, I have now been " discharged," and, so far as I am aware, " with a good character."

Railwaymen and Strike Ballots.

A NUMBER of RAILWAY MAGAZINE readers have enquired how it is the executive of the National Union of Railwaymen possesses the power to order its members to withdraw their labour without first of all informing them what is in dispute, and then taking a vote by ballot upon the subject. Strange as it may seem, bearing in mind the genesis of the recent nine-days' strike, the railwaymen's ballot was abolished at the instigation of their trade union leaders, as a safeguard against unjustifiable and unnecessary strikes!

When, out of three separate railway societies in existence at the time of the strike in 1911, the National Union of Railwaymen was formed, the question was thoroughly debated. Provision for voting by ballot was part and parcel of the old rules of the three societies in question, the most important of which was the Amalgamated Society of Railway Servants.

Students of the history of the trade union movement in the railway world are aware that in the old days, from time to time, when labour trouble was to the fore, the members were balloted. Sometimes, when the voting produced a balance in favour of a strike the leaders for some reason or other —often their more accurate knowledge of the real state of affairs—would refuse to carry out the mandate, and much acrimonious controversy as a consequence arose. Among the railwaymen's leaders who stoutly resisted the argument that an executive was bound to call a strike on every occasion a majority of members cast their votes in favour of one, was Mr. Richard Bell, a predecessor of Mr. Thomas. For refusing to put into operation what he considered to be an ill-advised mandate, Mr. Bell was more than once the target for violent attack from would-be strikers. As a result, when the National Union of Railwaymen was formed, it was decided the ballot should be abolished, and that it should be at the discretion of the railwaymens' executive as to when or whether withdrawal of labour should or should not be ordered. At the time it was felt this course would be better than that the new society should, like the old ones, be racked and riven with dissension every time a small but active group of malcontents secured a temporary following in an endeavour to provoke a conflict with the companies. It is understood the subject will come up for reconsideration at a special conference that is about to be held to discuss the revision of the society's rules.

During and since the recent strike, many railwaymen have complained of the absence of a ballot before being ordered by their union to take part in an abortive attempt to hold up the community. What the result of the discussion of the point at the coming conference will be we do not pretend to be able to predict, but RAILWAY MAGAZINE readers will appreciate that for the railwaymen's leaders the problem is a vexed one, and it may be they will decide that the responsibility be shifted to shoulders other than their own. It is difficult to exercise autocratic powers in a country so determinedly democratic as Great Britain.

Inland Waterways.

DURING the war, attention was drawn to the utility of English inland waterways for the transport of non-perishable commodities, and the railway strike has further emphasised the relief that may be given the rails by the use of rivers and canals. Early in the strike the Ministry of Transport urged the barge owners to concentrate their energies upon conveying coal from the pits to the great industrial centres, and this action on the part of the authorities may be taken as the harbinger of further effort to develop water-borne traffic and thereby ease the congestion of transport by road and by railway.

In the past the idea has been prevalent that the railways regarded rivers and canals as their natural enemies, and for the decay of inland water transit in Great Britain it was held that the magnates of the iron road were mainly responsible. Be that as it may, the unprejudiced person possessing knowledge of the real facts will admit that the railways found in inland water-transit a competitor of no mean order, when the maintenance of rail-borne tonnage was at stake. The Ministry of Transport, doubtless

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has full details duly docketed, and is not likely to lose sight of this valuable means of relieving railway congestion.

In British railway history, there is perhaps no closer connection between a railway company and a canal company than that afforded by the North Staffordshire Railway and the Trent and Mersey Canal, formerly known as the Grand Trunk Canal In fact, the North Staffordshire Railway may be said to be owned by the Trent and Mersey Canal Company, as the directors of the latter corporation were the promoters of the railway. One of the provisions of the Act of Parliament authorising the construction of the railway was the compulsory purchase of the canal. RAILWAY MAGAZINE readers interested in the subject of up-to-date canal working by a railway company should refer to Mr. C. Dean's illustrated article, "Electric Machinery and Appliances on the North Staffordshire Railway." It will be found in our issue for July, 1914.

Enamelled Metal Season Tickets.

IN view of the necessity for continuing to require season tickets to be shown on every journey, the Metropolitan Railway is issuing, as an experiment and to meet the convenience of season-ticket holders, enamelled metal season tickets to passengers who are prepared to take them out for twelve-monthly periods. For the present they are issued between Harrow-on-the-Hill and Baker Street, and Harrow-on-the-Hill and Liverpool Street via Baker Street. Specimen first and third-class tickets are illustrated. It will be seen that the first-class tickets are circular and the third-class rectangular with rounded corners. The design is enamelled in red, white and blue, the colours being arranged to facilitate identification of the respective issues. If these tickets are found to meet with general favour and a sufficient number are taken out, the system will be extended to other points, and possibly be made general. In consequence of the difficulty attending the manufacture of these tickets at the present time it is necessary to give at least one month's notice before the ticket is required. The tickets can only be issued from the first day in any month, but arrangements will be made to adjust the dates of expiry of existing tickets where necessary.

Unloading Milk Churns from Trains.

A NEW method of unloading milk trains, devised by Inspector Sadler, London & South Western Railway, Wimbledon, was recently demonstrated, on the arrival of the milk train due at Wimbledon at about 11.45 a.m. A van was detached from the train, in order to enable the demonstration to be made. The device is extremely simple, as well be seen from the illustration reproduced on the opposite page. It consists of a flat wooden board 5 ft. long by 2 ft. broad, the head of which is attached to the railway vehicle requiring to be unloaded. In the centre of the board are two metal straps or runners on which the churns slide down in an upright position. The tail of the board is provided with a steel landing strap, which rests on the platform and carries the churns clear of the board. There is a steel guide rail on either side of the board, the head of the board being protected by a steel head plate. The board is so adjusted as to give a suitable gradient for the churn to slide down smoothly and without any violence. By this method it is claimed that the amount of labour required in unloading milk churns is appreciably reduced. At Vauxhall recently 250 churns, with the aid of this device, were unloaded by two men in 16 minutes, which time included pulling up the train twice. On the previous day six men,

ENAMELLED METAL SEASON TICKETS, METROPOLITAN RAILWAY.

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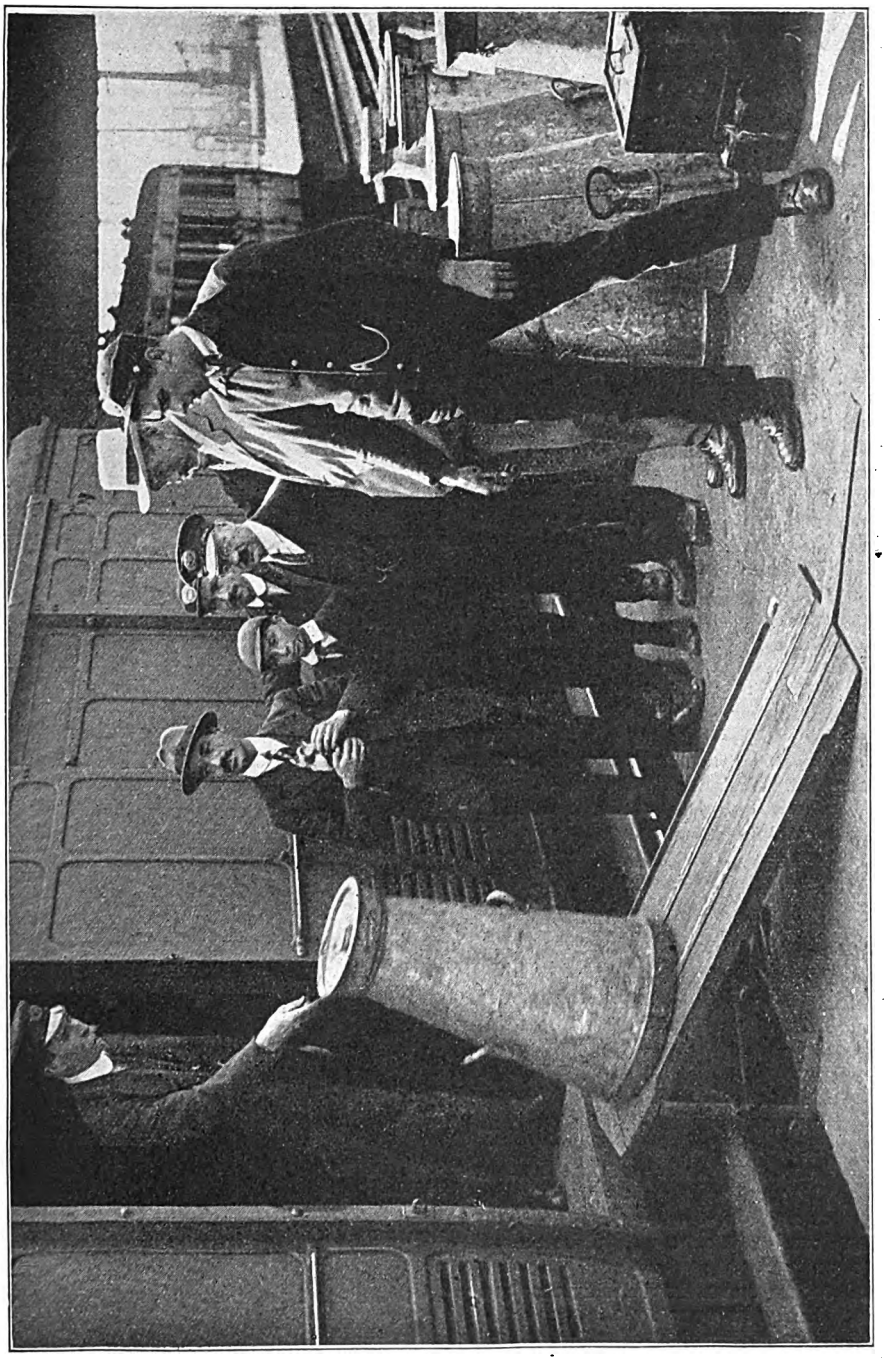

NEW METHOD OF UNLOADING MILK CHURNS. LONDON & SOUTH WESTERN RAILWAY. [*Topical.*

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under the old conditions, took 24 minutes to unload the same number of churns. With four boards in use four vehicles could be unloaded by eight men, whereas at present it requires 12 men.

Statistics of War Transportation in France.

In the course of a paper read before the British Association at Bournemouth recently, many interesting statistical aspects of railway transportation in France were brought out by the author, Sir George Beharrell, D.S.O., now Director-General of Finance and Statistics, Ministry of Transport, but who was for some time Assistant Director-General of Transportation in France, and before that, Assistant Goods Manager of the North Eastern Railway. Indeed, the paper affords full justification for the relatively elaborate statistics compiled by the Transportation Services during war conditions in France. Statistics constituted the only means whereby the Director-General of Transportation could satisfy himself that the services for which he was responsible were being efficiently managed. Moreover, conditions and demands changed so quickly that rapidity of compilation was essential, and the maintenance of a standard whereby preliminary statistics were available on the Tuesday evening for the week ended the previous Friday midnight, followed by complete statistics ready for circulation on the Thursday following, was no mean achievement, bearing in mind the conditions under which the work was done. Sir George Beharrell pointed out that these statistics not only told each responsible officer what he was doing, where he was going backward or forward, and how he compared with his opposite number in other places, but also informed other branches of the service what transportation was doing for them and where they fell short in assisting transportation to obtain the best results.

In the summer of 1916 the docks in France were seriously congested, and special measures were taken for allocating and distributing traffic. In February, 1917, the average tonnage discharged was only 10 tons per ship per hour in port; but in the spring of 1918 the tonnage discharged in certain weeks was 37½ tons per ship per hour in port, an increase of 275 per cent. This improvement was realised partly by increased numbers of railway wagons and locomotives, but was also due to improved efficiency on the quays. Early in 1917 in one week the equivalent of 100 shipping days was lost, and this was not an isolated case. This was gradually reduced to six shipping days per week. Without any addition to the accommodation, imports increased from 130,000 tons per week to a maximum of 225,000 per week. During 1918 just under 1,000,000 tons of traffic were conveyed across the Channel by barges. Over two-thirds of this amount proceeded direct up the canals in France to depôts or canal-heads. The Channel train ferries dealt with 80,000 tons in one quarter in 1918, a great gain being that heavy traffics, which would ordinarily have occupied very considerable time in loading and unloading were dealt with so rapidly.

Broad Gauge and Light Railway Lines.

In broad gauge railway engineering, records of 148 miles of railway reconstructed and of 45 miles constructed through virgin country per week were realised. The number of broad gauge trains worked to railheads and depôts on lines of communication rose from an average of 180 per day in March, 1917, to a maximum of 298 per day in August, 1918. This was exclusive of various supplementary services. During 1918, hours per locomotive in steam per day were reduced, but the mileage was increased by substantial percentages, with considerably reduced coal consumption. In regard to wagon-user, the total time at railhead became stabilised round 13 hours as an average for all armies, actual unloading taking about six hours. These figures were maintained in spite of increased attention paid to railheads by enemy artillery and aircraft.

The light railway system was designed to give the Army mobility. In the end, upwards of 1,000 km. were under operation at one time, and the traffic conveyed exceeded 250,000 tons in one week, though the usual volume of traffic was about 160,000 to 180,000 tons per week. Working on these lines was very closely watched. In July, 1918, the average ton-miles per power unit per day had risen to 658, as compared with 242 in 1917. Tonnage per wagon unit in service per day gave a best weekly average of 8·9 tons, but the figure never fell below 6 tons. The number of loaded wagon-miles per route-mile per day rose from 23½ miles to slightly under 50. Loaded wagon miles per effective (personnel) per day rose from 2·4 to 5·4. Mileage per locomotive in steam per day improved from 17·5 to 41·8 (excluding tractors), and reductions of nearly 50 per cent. in coal and 30 per cent. in petrol were realised.

The North British Railway's Part in the War.

In view of its geographical position, very heavy demands were necessarily placed upon the North British Railway, and as it alone had direct access to the great naval base at Rosyth, and it also served so much of the eastern coast line, the pressure was

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almost as heavy on the naval side as in regard to military and munition traffic. Indeed, in several respects the North British Railway occupied a position akin to that of no other system. Furthermore, as the "Secretary Company" for Scotland, it was through the North British Railway that arrangements were made between the headquarters of the Scottish Command and the Scottish railways.

The principal military training centres on the North British line were situated at Edinburgh, Glencorse, Peebles, Galashiels, Stobs, Hawick, Haddington, Berwick, North Berwick, Dunbar, Falkirk, Glasgow, Hamilton, Dumbarton, Inverkeithing, Kinghorn, Stirling, Tillicoultry, Kirkcaldy, Dunfermline, Kinross, Perth, Leven, Ladybank, Cupar, St. Andrews, Wormit, Dundee, Barry Links, Montrose, and Aberdeen. From these centres, between the outbreak of war and December, 1918, there were transported in special and ordinary trains, 250,000 officers and men for overseas, while the number undergoing training who were carried between different camps was 700,000.

Special trains were also in demand for the conveyance of horses, via the "Waverley" route and Carlisle, from the depôts at St. Boswell's, Gorgie, Cupar, and Maryhill, to Swaythling, the collecting depôt for the Continent.

American troops to the number of about 8,000 were, on their being landed at Glasgow, when the United States joined in the war, sent to the south of England by the North British route via Edinburgh and Carlisle.

Great importance was naturally attached to the Forth and Tay defences. The railway bridges by which the estuaries there are spanned carry the main trunk lines from Edinburgh and the south to Dundee and Aberdeen; and, in order to ensure their protection, large garrisons were stationed on both banks of each of the firths, as well as on several of the islands—a measure of precaution which, incidentally, meant still more traffic for the railway.

In connection with the demobilisation of the Army, dispersal camps were formed on the North British line at Duddingston, near Edinburgh, and at Kinross, on the main line between Edinburgh and Perth, special trains to and from these places being run daily as long as was necessary. Down to the closing of the Duddingston Camp on March 8, 1919, there had been passed through it, on their return to civil life, no fewer than 52,206 officers and men. From the date mentioned, the Kinross Dispersal Camp dealt with all the demobilised men for Scotland, and by July 5, 1919, there had been taken to it, and brought away again, by rail, 72,130 officers and men. The North British had to deal as well with special train contingents of men *en route* for Georgetown Dispersal Camp, on the Caledonian Railway.

Naval Traffic.

In regard to naval passenger traffic, special leave trains were run weekly between Rosyth, Invergordon, Thurso, or other naval bases in Scotland and Chatham, Portsmouth, Plymouth, or other naval ports in England. The number of passengers conveyed by these trains over the North British system down to the end of 1918, was 375,000. These figures are exclusive of the passengers who travelled by the Euston-Thurso naval train, which, from May 21, 1917, to April 30, 1919 followed the North British "Waverley" route between Carlisle and Perth. The figures are exclusive, also, of passengers by naval short-leave trains run daily between Rosyth dockyard and Edinburgh and Dunfermline, and between Port Edgar and Edinburgh, the number so carried from and to Rosyth and Port Edgar averaging 2,000 per day. In December, 1918, the whole of the personnel of the Grand Fleet were granted leave for twelve days. The men left in parties of about 14,000 at a time, and the strain involved was such that on some days as many as 32 special trains had to be run out of or into Rosyth Dockyard or Port Edgar, in addition to the numerous other specials on account of the leave allowed simultaneously to the Army.

One of the naval ambulance trains which went regularly between various hospitals in Scotland and England made a weekly run with sick officers and men from Larbert (where there was a naval hospital), from Port Edgar (where sick and wounded were taken from the ships) and from hospitals in and around Edinburgh to Portsmouth, Plymouth and Chatham. Altogether the number of trips made by naval ambulance trains over the North British systems exceeded 1,200. Of military ambulance trains, conveying sick and wounded soldiers from Dover or Southampton by either the East Coast or the Waverley route, for hospitals at Edinburgh and Bangour (where, some 15 miles from Edinburgh, a large military hospital had been set up) the number was close on 600.

Aeroplane depôts or aerodromes directly served by the North British included those situate at East Fortune, Gullane, Turnhouse, Aberdour, Donibristle (near Inverkeithing), Crail, Leuchars, Dundee, Montrose and Aberdeen.

Munition and Coal Traffic.

Workmen's trains further helped materially to swell the proportions of the passenger traffic. The construction of the dockyard

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at Rosyth was still far from complete on the outbreak of the war, and 24 workmen's trains per day, conveying between the Dockyard station and Edinburgh, Dunfermline, Kirkcaldy, &c., the workers who were still engaged thereon, were continued during the entire period of hostilities. Numerous workmen's trains had also to be run on various parts of the system. The national munitions factory at Gretna was served off the Edinburgh and Carlisle main line by a branch from Longtown, formerly the property of the North British, but now a Government railway.

One exceptionally heavy traffic dealt with on the Berwick route consisted of Admiralty coal from South Wales to Scottish East Coast ports, such as South Leith, Grangemouth, and Burntisland. During the war period the proportion of this traffic worked by the North British route, via Berwick, was 129,000 wagons, or, approximately, 1,290,000 tons, involving an average haulage on the North British system of 75 miles per train, with the working of a like number of empty wagons in the reverse direction. The North British also undertook the haulage from Glasgow (Corkerhill) to Grangemouth of the Admiralty coal traffic conveyed via the Glasgow and South Western route. This amounted to a further 38,000 wagons, or, roughly, 280,000 tons, with the haulage of the same number of empty wagons from Grangemouth to Corkerhill on the return journey.

Of the railway staff, 4,836 joined His Majesty's Forces, out of a total of 24,625 in the employ of the company on the outbreak of the war. In the operating department, 119 women were employed, principally as gatekeepers, in August, 1914; but with the advent of war-time conditions, this number steadily increased to nearly 800, these being engaged principally as porters, ticket collectors, lampwomen, signalwomen and clerks. In the goods department no women were employed prior to August, 1914; but during the war there were, at one time, 534 women and girls engaged in clerical or manual work.

Re-opening of the South Eastern and Chatham Railway between Folkestone and Dover.

IN the June RAILWAY MAGAZINE the great landslip at the Warren, Folkestone, was described, this disaster causing direct railway communication between Folkestone and Dover to be entirely closed since December 19, 1915. With the war at an end it became possible to take steps to restore the track between Martello and Abbotscliff Tunnels, a distance of nearly 2 miles, and the railway was reopened for traffic on Monday, August 11, as between Folkestone Junction and Dover Town, a total distance of 5 miles 53 chains. Last month an illustration of the reopened line was reproduced, and we are now able to give another view, with some particulars of the work involved.

Although this restoration is regarded by the directors as a temporary measure only, in view of the geological features of the Warren, the work involved has been considerable, some 82,000 cubic yards of chalk and other debris having to be handled in order to provide a new formation level for the reconstructed railway. As a measure of the extent to which the original line was buried by the great fall on December, 1915, it may be stated that of the quantity just alluded to no less than 64,000 cubic yards of chalk, &c., had to be shifted within a length of 15 chains, and since only 17,000 yards of this material were needed to bring up the low places on the railway to the requisite height, it will be seen that the bulk of all this debris had to be got rid of in some other way, and this was effected by tipping it over the low cliff on the seaward side of the railway.

As reopened, the railway does not occupy between Martello and Abbotscliff Tunnels precisely the site of the original line, as when the landslide occurred the railway was thrust seawards *en masse* for a distance at the most extreme point of 160 ft., and advantage has been taken of the existing positions of old cuttings by following them as far as possible, and thus reducing the cost of the restoration. With regard to the actual working of the railway, two new signal cabins have had to be provided, one near the Dover end of Martello Tunnel, and the other near the western end of Abbotscliff Tunnel. It has been found possible to give the curves and gradients of the restored railway a main line character, the sharpest curve having a radius of about half a mile, whilst the steepest gradient is 1 in 220. Seeing that the original gradient was no better than 1 in 264, the results obtained are very favourable.

The reopening of the railway was hailed with satisfaction in both towns chiefly concerned, but looking at the matter from a general point of view the railway company now has its South Eastern main line route to Dover restored, thus relieving the oft-times congested route via Chatham and Faversham. We are indebted to Mr. P. C. Tempest, Chief Engineer of the South Eastern and Chatham Railway, for the foregoing particulars.

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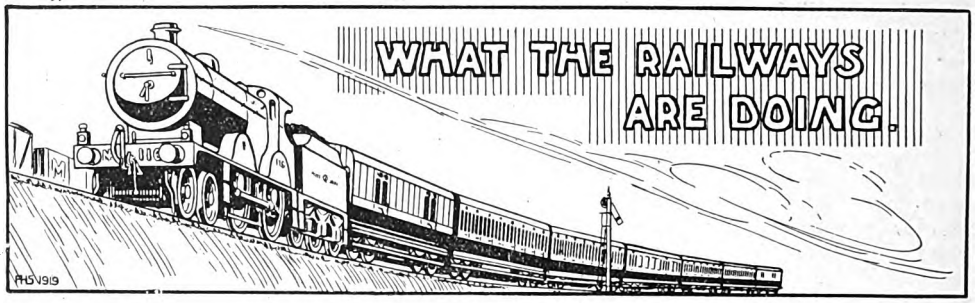

MR. G. MARSHALL, who has been appointed Goods Manager of the Great Northern Railway, in succession to Mr. G. Shaw, was born in 1882 and educated at Winchester and New College, Oxford, where he obtained, in 1905, the Honours Degree (Lit. Hum.). Later in that year Mr. Marshall joined the service of the Great Northern Railway, and after obtaining experience in various capacities was, in 1910, appointed District Manager of the Main Line "B" Commercial Section of the Goods Department, with headquarters at Peterborough. In 1914, shortly after the outbreak of war, he joined the Army and served in India for three and a half years with the 9th Hampshire Regiment, eventually becoming adjutant. In 1918 he was transferred for service under the Indian Railway Board as Deputy Traffic Manager under Major-General Freeland. Returning to England in July of this year he resumed duties with the Great Northern Railway, taking up his new appointment on October 1.

MR. G. MARSHALL,
Appointed Goods Manager, Great Northern Railway.

* * *

MR. GEO. SHAW, who retired from the position of Goods Manager of the Great Northern Railway on September 30 last, was born in 1853, and joined the service of the Great Northern Railway as a probationary clerk in the Lincoln Goods Offices in September, 1867. His earlier years were spent in various positions on goods and passenger station duties, obtaining a general insight into all sections of the work. Later he was transferred to the office of the District Passenger and Goods Superintendent, eventually reaching the position of Chief Clerk and Principal Assistant, which he held for several years. In 1886, Mr. Shaw was appointed Rolling-Stock Controller for the whole of the Great Northern system, and five years later became District Goods and Passenger Superintendent for the Eastern Division, with headquarters at Boston. In 1902 he was selected for the position of Chief Goods Manager, holding this appointment until his retirement, having completed 52 years' service with the Great Northern Railway. In 1910 Mr. Shaw was elected Chairman of the Goods Managers' Conference of the Railway Clearing House.

* * *

A NUMBER of changes in the organisation of the Operating Department of the Underground Railways and London General Omnibus Company, Limited, are announced. Mr. J. P. Thomas has been appointed Assistant Operating Manager of the railways and 'buses; Captain A. Rozier has been appointed General Superintendent of the London General Omnibus Company, Limited; Mr. Thornton becomes Superintendent of the Line to the District and Tube Railways, in place of Mr. W. E. Blake, deceased. For the past 14 years Mr. Thornton, the new Superintendent, has been Chief Inspector of the District Railway. He started life when a youth in the Goods Department of the Caledonian Railway, under Superintendent Harvey, at Lothian Road, Edinburgh. Later, he undertook service in various grades

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with the North British Railway, Glasgow District Subways, Central London and Great Northern and City Railways, before he eventually joined the staff of the Underground.

* * *

RECENT railway obituary includes Sir David Stewart, an ex-Lord Provost of Aberdeen and Chairman of the Great North of Scotland Railway Company. He entered Aberdeen Town Council in 1889, and was at once elected to the civic chair in succession to the late Sir William Henderson. He occupied the office for two terms. In 1895 he contested South Aberdeen as a Unionist against Mr. (now Lord) Bryce, and reduced the Liberal majority from 1,745 votes to 864. He was given the LL.D. in recognition of his services to the University, and, as the outcome of public subscription, was presented with his portrait, painted by Orchardson. In 1896 Queen Victoria conferred the honour of knighthood upon him at Balmoral.

* * *

WE regret to record the death of Mr. William Kirtley, who was formerly Locomotive Superintendent of the London, Chatham and Dover Railway, from which position he retired on the amalgamation with the South Eastern Railway in 1898. The deceased commenced his professional career with the Midland Railway at Derby, whose service he joined as a pupil on April 24, 1854. He was afterwards Assistant Foreman in the locomotive and carriage and wagon Departments at Derby, Assistant Foreman in London, and subsequently returned to Derby as Foreman, resigning his position on the Midland Railway on May 31, 1874. Mr. Kirtley was 79 years of age.

* * *

AT the Railway Club monthly general meeting on October 14 Mr. Charles Travis, who recently left the Great Central Railway service to become Chief Assistant Editor of the *Railway Gazette and Railway News*, gave a particularly comprehensive paper entitled "A Survey of Recent Railway Developments." Mr. Travis is on the L.C.C. panel of lecturers on railway subjects, and this winter is lecturing on railway administration and economics at the Essendine Road Commercial Evening Institute. His paper at the Railway Club was a practical demonstration of his fitness for the work he has undertaken; he not only dealt in a masterly manner with many of the most pressing transport questions of the day, but he so fired the imaginations of his hearers that a very vigorous and lengthy debate followed the presentation of the paper. Mr. Travis was cordially thanked by Mr. W. Parker, who presided, and by the various members who contributed to the discussion. At the members general meeting on November 11 Mr. Evans will deal with "Underground Train Operation."

* * *

AT the end of September, Mr. W. D. Phillipps retired from the post of General Manager of the North Staffordshire Railway, which he has held for the last 37½ years, his successor being Mr. F. A. L. Barnwell, the Chief Engineer of the Company, who is now the General Manager and Engineer. Born in 1839, Mr. Phillipps is the eldest son of the Rev. Thos. Phillipps, Rector of Dewswall with Callow, in Herefordshire; his mother was a younger daughter of the then, and aunt of the present Lord Biddulph, of Ledbury Park, Herefordshire. In 1854, Mr. Phillipps went as pupil to the shipbuilding and engine-building yard of Mr. J. Scott Russell at Millwall. Scott Russell was at that time, in addition to numerous merchant vessels, engaged in building for the Admiralty one of the first iron-clad vessels of war. She was a wooden vessel of about 10,000 tons sheathed from stem to stern with plates of iron 4½ inches thick and quite impervious to the guns of any vessel then afloat. On the night before the day on which she was to be launched, she was set on fire by the carelessness of some of the workmen and launched herself a blazing mass into the Thames mud, as luckily it was low tide at the time. Scott Russell also built the Great Eastern steamship of 22,500 tons. She was designed by Mr. I. K. Brunel, and was at least double the size of any ship then in existence. Owing to her great length she had to be built and launched "broadside on" to the river. Mr. Phillipps was present at the abortive attempt to launch her, acting as Assistant to Mr. Brunel, and had to announce to him that, owing to the subsidence of the launching slips at the stern, when the great weight of the vessel came on them, two men had been killed and the stern of the vessel was immovable. The following day Mr. Robert Stephenson, the other most eminent engineer of the day, was called in consultation. There was much arduous work to be done before the ship was successfully launched, but such a large vessel was altogether before her time, and commercially she was a failure. Brunel was also the engineer of the Great Western Railway, and the great advocate of the wide 7-ft. gauge as Stephenson was of the narrow, or 4 ft. 8½ in. gauge. The 7-ft. gauge which at one time extended from Paddington to Penzance, and to New Milford is now a thing of the past, having been altered to 4 ft. 8½ in. many years ago.

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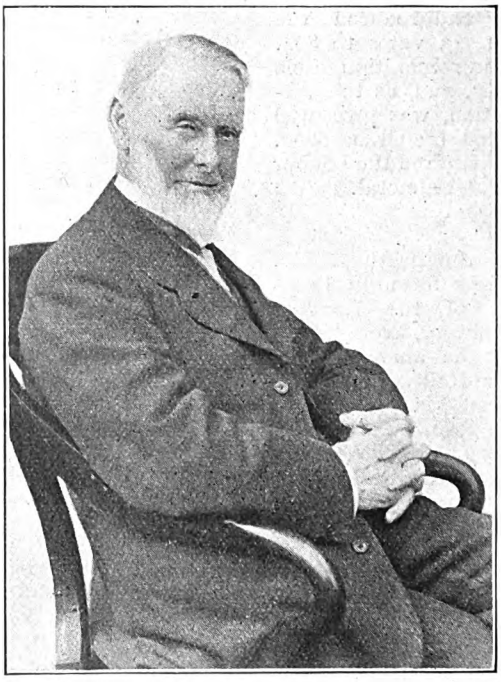
In 1857 Mr. Phillipps left Scott Russells and went as pupil and assistant to the engineer of the Llanelly Railway and Dock Company, and in 1860 was made manager of that concern. In 1871 the London and North Western and the Great Western Railways Companies bought up the Llanelly Company, which at the time consisted of a dock and 70 miles of railway, commencing, with termini at Carmarthen, Llanelly, and Swansea, and divided it between them, Mr. Phillipps going to Swansea as district manager of the Swansea and Central Wales section of the London and North Western Railway. From Swansea, he was promoted to Manchester as superintendent of the North Eastern Section of that railway, and in February, 1882, became Manager of the North Staffordshire Railway. Mr. Phillipps is the oldest member of the Railway Clearing House, his first appearance there being in 1866, and in 1902 he was Chairman of the General Managers' Conference. He does not sever his connection with the district, as he continues to be Consulting Manager and a Director of the North Staffs Railway, and is also Deputy Chairman of the Staffordshire Potteries Water Works Company.



MR. WM. DOUGLAS PHILLIPPS,
General Manager,
North Staffordshire Railway, 1882–1919.

* * *

During the 37½ years that Mr. Phillipps has been connected with the North Staffordshire Railway Company, there has been a considerable increase in the traffic on the line as the following figures will show, 1913 is the last complete year before the war, and before the Government took control of the railways. For instance:—

	1882.	1913.
The number of passengers carried ..	5,528,000	9,260,000
Receipts	£159,500	£232,700
Tons of goods and minerals	3,683,000	7,700,000
Receipts	£388,000	£723,000
Parcels, horses, carriages, milk, &c. ..	£18,500	£56,300
Train miles run ...	2,200,000	4,563 000

To carry this increased business, the number of locomotive engines has increased from 125 in 1882 to 191 in 1913, and carriages and parcels vans, &c., from 332 to 525, and the size and carrying capacity of each engine and each carriage has been more than doubled. The capital account has been increased by the very moderate sum of £1,254,000, notwithstanding that the mileage of the railway has been increased from 195 to 206 miles by the construction of a line from Leek Brook to the carboniferous limestone mountains at Froghall, and the opening of the extensive quarries there, and the construction of stone-breaking machinery, &c. Also a short branch has been opened to Trentham Park. The dividend paid on the ordinary stock of the company was 2½ per cent. in 1881, 3¼ per cent. in 1882, and 5 per cent. in 1913. 23 additional stations and 10 halts have been opened.

* * *

MR. HENRY GREENLY, of Messrs. J. H. Jubb, Limited, model engineers, Sheffield, during the recent railway strike, drove a locomotive on the Midland Railway, working the special Chesterfield–Sheffield trains and goods trains on the Sunday. Mr. Greenly is editor of the models section of our contemporary, *Everyday Science*.

* * *

MEMBERS of the Glasgow and South Western Railway City and Suburban Reading and Recreation Club (Glasgow), held a very enjoyable meeting on Wednesday, October 15 for the purpose of formally taking possession of new premises which have been provided for them with the assistance of the railway company, and in connection therewith a

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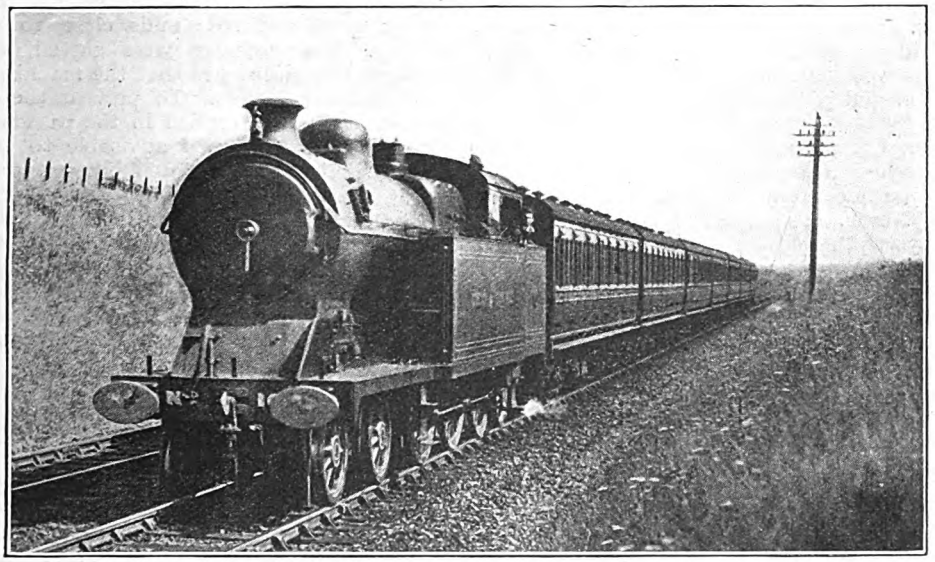

Photo.] GREAT CENTRAL RAILWAY. [*Capt. G. G. Templar, R.A.*

Down Outer Suburban Train, 4-6-2 Tank Locomotive No. 166.

hearty vote of thanks was accorded to Mr. David Cooper, the General Manager, for his sympathetic attitude and the active part he has taken in the provision of such a very suitable meeting place. Prizes were presented to the successful competitors in the bowling matches which have recently been held, and a most enjoyable concert followed.

* * *

AT Horwich the Railway Mechanics' Institute has commenced a very useful winter's work with an exceedingly comprehensive selection of subjects for study. Mechanical engineering heads the list, but English literature and cookery are also included with a host of other useful items. As is appropriate in an institute connected with the Lancashire and Yorkshire Railway, Sir John A. F. Aspinall is president, and the vice-presidents are Mr. G. Hughes and Lieut.-Colonel E. O'Brien, D.S.O.

* * *

SOME 20 or more members of the Railway Club took part in a visit to Nine Elms running sheds, London and South Western Railway on Saturday, September 20th. Acting Inspector T. Taylor conducted the party round the works, and through his knowledge of locomotives and his past experience as an engine driver proved an admirable and entertaining guide. Several members availed themselves of the opportunity of photographing the locomotives on view. New members of the club will be glad to know that arrangements have been made for two or three of the Committee to attend at headquarters, 92, Victoria Street, London, S.W. 1, from 6 p.m. on Tuesdays and Fridays, and it is hoped this arrangement will afford opportunities for country and newly-joined members to acquaint themselves more fully with the facilities provided.

* * *

A FIRM of booksellers well known to many RAILWAY MAGAZINE readers is that of W. and G. Foyle, Charing Cross Road, London. The firm has been converted into a limited company. Although Foyles are mainly known to our readers as dealers in second-hand railway, engineering and scientific works, their business is by no means limited to such subjects. The book-store is indeed a place to explore, and many of our provincial readers, when in London, make a point of finding Foyles.

* * *

MANY RAILWAY MAGAZINE readers may like to know that the name of the British Westinghouse Electric and Manufacturing Company, Limited, has been changed to that of "Metropolitan-Vickers Electrical Company, Limited." The Certificate of the Registrar of Joint Stock Companies bears the date September 8, 1919.

* * *

WE have received a copy of a bulletin entitled "Carry On," which it was proposed to issue daily during the period of the railway strike, to the volunteers and loyal

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workers on the London Underground Railways. One copy was issued, and No. 2 was in preparation when the strike ceased, and it was therefore turned into a souvenir edition and presented to the workers.

* * *

THE Cambrian Railways Company have remodelled their winter train service, and the journey from London, the Midlands and North, also from South Wales to Aberystwyth and the Cardigan Bay Coast has been considerably accelerated. Trains leaving Paddington at 10.15 a.m., Birmingham 12.55 p.m., Liverpool (Lime Street) 11.40, Manchester (London Road) 11.50, Cardiff 10.55 a.m. will be due to arrive Aberystwyth 5.15 p.m., 65 minutes earlier than last winter. On the return journey a new fast train will leave Aberystwyth at 10 a.m., due Manchester 3.35, Liverpool 3.35, Birmingham 2.45, Paddington 5.25 p.m., a reduction of two hours in the journey from Aberystwyth to London. The service to and from Aberdovey, Towyn, Barmouth, Criccieth, Pwllheli, &c., is correspondingly improved. Tea will be served on these trains on the Cambrian Line during October, between Whitchurch and Welshpool and Aberystwyth, and through carriages will run between Paddington, Birmingham, Shrewsbury, Liverpool, Manchester and Aberystwyth throughout the winter months.

* * *

Traffic between Bath and Bitton, on the Mangotsfield Branch of the Midland Railway, was suspended for some two hours on October 7, owing to a disastrous fire in a timber yard and saw mills close to the railway. The premises were gutted, and the heat was so intense that the machinery was rendered useless. To prevent the explosion of the gas carried in the passenger coaches, it was deemed advisable to stop traffic till the fury of the flames was practically exhausted. A signal post was charred by flames, and a sleeper fence separated from the buring premises by three sets of metals commenced to smoulder. Eventually, single-line working was adopted on the line farthest from the flames, and the coaches were "cooled down" by fire hose before passing the spot.

* * *

THE work which is now going on at the Metropolitan District Railway Station, Charing Cross, is a source of curiosity to the public. The task which is being undertaken is another step towards improving this busy centre by the construction of a new subway to avoid the congestion which now takes place in the circulating areas at the top of the escalators and on the east-bound platform at the foot of the exit stairs (west end). The achievement will consist of a new subway with stairs leading thereto from the two "District" platforms, and will be used for passengers going from the District platforms or the street to the tubes, the existing stairs, which now carry traffic in both directions will be retained for out-going passengers only. A new exit from the District westbound

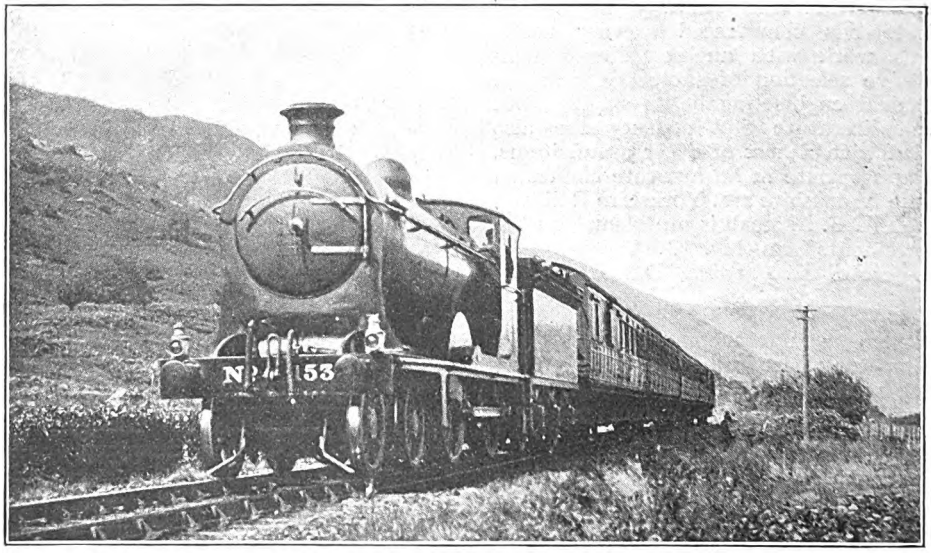

Photo.] NORTH BRITISH RAILWAY. [*E. A. Gurney-Smith.*

West Highland Train approaching Ardlui. 4-4-0 Locomotive No. 153

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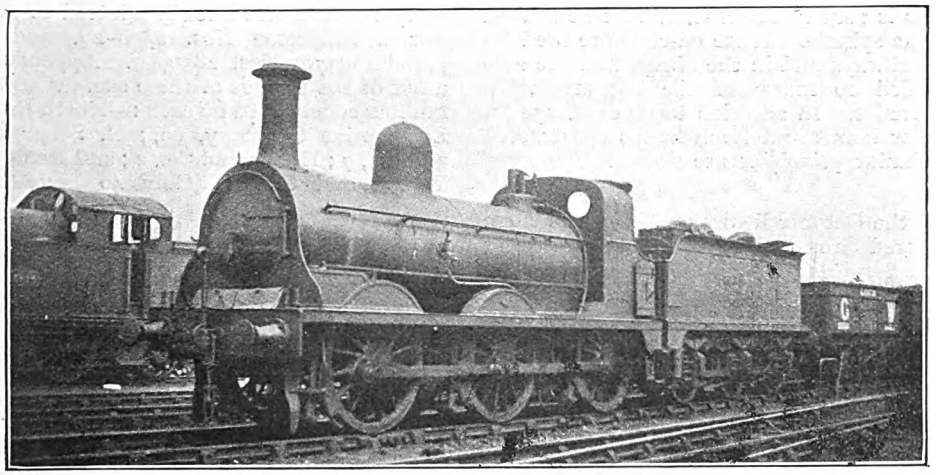

Photo.] GLASGOW & SOUTH WESTERN RAILWAY. [*F. H. Stingemore.*

0–6–0 Locomotive No. 308, working on Great Western Railway.

platform is also proposed. This will be formed by a new stairway from the platform almost exactly similar to that on the east-bound side. A new footbridge immediately to the west of the station buildings and at street level will be provided, with an exit on the Embankment.

* * *

At the recent Shipping, Engineering and Machinery Exhibition, Olympia, the Westinghouse Brake Company, Limited, exhibited an interesting model to a large scale of the valve of a floating dock. This valve is operated by the Westinghouse Brake Company's electro pneumatic system from the bridge or the control cabin of the floating dock, indicators being fitted to show the position of every valve at different parts of the dock. Various types of air compressors were shown, both steam and electrically driven, the large sizes being intended for general shipyard purposes and the smaller sizes for use in the stokehold for cleaning boiler tubes, &c. The firm, as most travellers know, make a speciality of steam heating systems, and among the exhibits was one for supplying hot water at any suitable temperature to cabin lavatory basins by means of a variable steam supply. Low pressure radiators fitted with automatic regulating valve were shown, these being both of the usual vertical type for cabins, or of the long horizontal type for corridors. One of the most prominent features of the exhibit was a set of wheels driven by the Westinghouse-Morse chain. These chains are made for general power transmission in sizes suitable for ½ h.p. up to 5,000 h.p., and are all fitted with the firm's patent rocker joint whereby friction is greatly reduced and the drive is rendered practically silent. The model exhibited showed various sizes of chain driving wheels of different diameters while in a case the sections of the links and pins of the various pitches of chain were displayed. To many Railway Magazine readers visiting the exhibition the stand of the Westinghouse Brake Company, Limited, formed a centre of attraction, and it came as a surprise to some to find that the activities of the firm extend so far beyond the boundaries of the railway world.

* * *

From October 1 the Westinghouse-Morse chain manufacture is being carried out at Letchworth, Herts., by the Westinghouse-Morse Chain Company, Limited, instead of as previously by a department of the Westinghouse Brake Company, Limited, King's Cross, N. 1.

* * *

Joseph Kaye and Sons devoted their stand at the recent Shipping, Engineering and Machinery Exhibition almost entirely to the different types of oil-cans and oil economisers. Specimens of oil-cans suitable for every conceivable purpose may be seen here, and the special feature of their manufacture is that they are seamless. The inside parts are coated with tin to prevent verdigris and other forms of corrosion. Every improvement which experience can suggest or ingenuity devise is embodied in the design of these cans. Thus the spout is double-wrapped and practically seamless, and is fixed in such a way that it can be bent into any form without breakage or leakage. The solid handle is riveted to the can and the thumb button of the valve, not being soldered

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on as is usually the case, cannot be broken off the spindle. These oil-cans are used by the railways and in the Navy, and are also supplied to many of the big steamship companies. In addition to oil-cans, special bunker lamps and torch lamps constructed on similar principles are shown.

* * *

IN the October RAILWAY MAGAZINE there appeared an article entitled "Summer Train Services in 1919," wherein was given a table showing the fastest times between London and provincial towns, 1914, 1918 and 1919. By some misfortune two of the column headings became transposed, so that "July, 1914" and "October, 1918" should read "October, 1918" and "July, 1914" respectively. From the number of readers who have pointed out the error it is apparent not many were misled by it, but it is regretted just the same.

* * *

OUR Crewe correspondent, Mr. C. Williams, reports:—"A further ten 2-8-0 mineral engines ('R.O.D.' type) have recently arrived on the London and North Western Railway from the North British Locomotive Company., seven of which have been constructed at the Atlas Works and the remaining three at the Hyde Park Works. These engines, on arrival, bore R.O.D. numbers as follows:—1787–9, 2139–42 (Atlas 22080–82 and 22229–32) and 2040–2 (Hyde Park, 22134–36). They have been renumbered in the London and North Western list, 1747, 2231, 2268, 85, 98, 103, 201, 12, 2035 and 2083 respectively. It is reported that 40 additional engines of this type are in course of delivery (several of which are already in service), making a total of 70 in all. Several more "Jubilee' class compounds are being converted to simple, including Nos. 1902, 1909 and 1939. The following four-cylinder compound mineral engines are being simplified and superheated:—Nos. 1065, 1285, 2036 and 2568. All are 0-8-0 type, with the exception of 1065, which is 2-8-0. No. 487 *John o' Groat*, a 6-ft. "Jumbo," has been scrapped, and No. 155, *I. T. Williams* ('Claughton' class), is having its name changed to *Sir Thomas Williams.*'"

* * *

IN a further communication, Mr. Williams remarks:—I am informed that the London and North Western Railway are taking over 70 more of those 2-8-0's from the Ministry of Munitions, making a total of 100 altogether. As regards the 30 previously taken over, these, I understand, will not carry the numbers already allotted to them, but will become Nos. 2800–29, and the remaining 70, Nos. 2830–99. Appended is a list of the makers of these engines and the number constructed by each:—North British Locomotive Company, 90,; R. Stephenson and Co., 7; Kitson and Co., 2; and Nasmyth, Wilson and Co., 1. Only 40 have been overseas, the remainder coming direct from the makers. If of sufficient interest to your readers, I shall be pleased to furnish full particulars as to the renumbering, &c. A new series of 4-6-0 passenger engines ('Prince of Wales' class) will shortly be turned out—Nos. 56, 67, 635, 686, 812, 969, 1325, 1341, 1355 and 1620. These numbers, it will be remembered, were previously carried by engines of the R.O.D. 2-8-0 type, which have been renumbered 2800, 2806, 2801, 2803, 2804, 2805, 2807, 2808, 2809 and 2802 respectively.

* * *

MR. MALCOLM M. NIVEN writes:—It may perhaps interest RAILWAY MAGAZINE readers to learn that Glasgow and South Western Railway engine No. 11, the first four-cylinder express locomotive in Great Britain has now become 394. As this was an outstanding locomotive, and was particularly important on the Carlisle Main Line in the latter part of last century readers will be interested. It has now, of course, a large boiler, but otherwise is similar as before.

* * *

IN connection with Queensland Railway developments, it is reported that the Public Works Commission, which consists of Government members, has been on an extended tour in the north, taking evidence regarding the construction of railways, both from the Barkly Tableland towards the Cloncurry Railway system and also in the more immediate Gulf country. The commission is reported to have been surprised to find that in the region adjoining the South Australian border, where there is some very fine country, the land is only able to carry 15 beasts to the square mile. It is said that if the land were held in smaller areas and improved, it could do better. "The Gulf country is the finest breeding ground for cattle in the State to-day, but cattle driven long distances by road lose so much weight that they have to be sold as stores, or else fattened in Southern Queensland district before they are fit for the meat works," it is declared. "A railway would eliminate this waste, and give the Gulf the full credit for wealth production to which it is entitled."

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Railways in "German" East Africa.
Midland Railway Locomotive History.
The Ilfracombe Railway.

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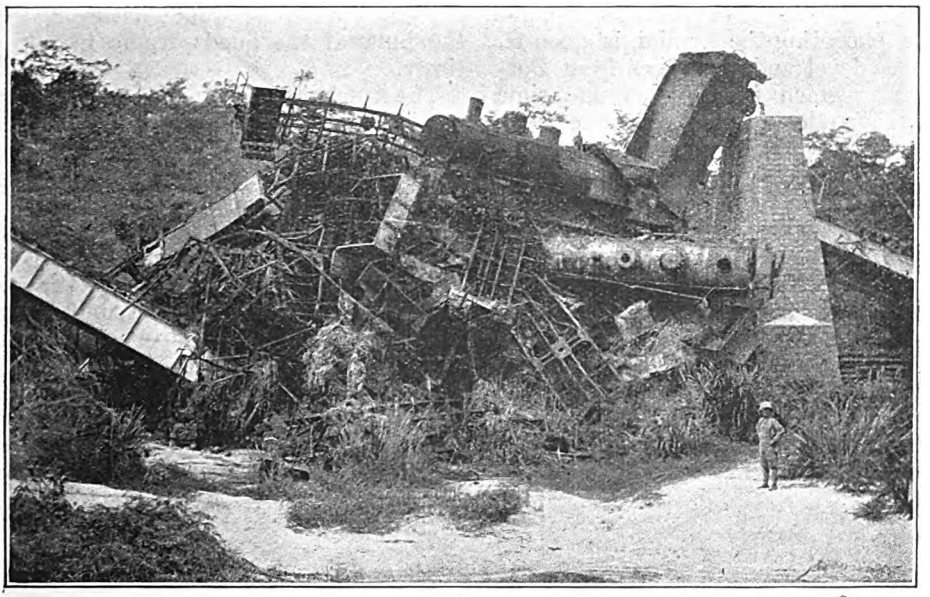

GERMAN DESTRUCTION OF ROLLING-STOCK AT MIKESSE.

The Central Railway of (Late) German East Africa.

By R. D. GAULD.

THIS notable African railway runs from Dar-es-Salaam, the chief town and port of the country, in a general direction of just north of west, to Kigoma, near Ujiji, on Lake Tanganyika, a total distance of 788 miles. It was commenced from Dar-es-Salaam in 1905, Philip Holtzman being the engineer and contractor, and was completed in 1914, the total cost being £5,800,000, or £7,436 per mile on the average.

A profile of the line shows that after leaving Dar-es-Salaam, the railway climbs to a height of about 650 ft. from the starting place, and falls again to Ruvu Bridge, where the River Ruvu is crossed. In their retreat from the coast during the recent war, the Germans destroyed every bridge on the line, and this was one of the largest. A temporary wooden structure was hastily erected by our Royal Engineers, and has satisfactorily carried all traffic since.

Morogoro, 130½ miles from Dar-es-Salaam, is the end of the first division of the line for operating purposes. Here are situated engine sheds, a small workshop, and a turntable. I had no opportunities of examining the turntable here, but the one in Dar-es-Salaam is turned by a toothed wheel (suitably geared down, so that one man can turn the table), which engages in a horizontal toothed rack, circular in shape, and of the same diameter as the table. The arrangement is simple, and requires much less effort to work it than do the tables so often seen in this country.

The scenery becomes much grander and wilder here, as the line skirts the northern spurs of the Uluguru Mountains, whose lower slopes are planted with rubber, sisal, and various tropical fruits. At Gulwe, 234 miles, we are on the Central Plateau, and into the big game country which, however, from all accounts, is not so well stocked as Uganda. We leave a cotton-growing district behind, and enter an arid region which extends practically to Tabora. Dodoma is the end of the second division, the third ending at Itigi, the highest point on the line, where there are fairly large engine sheds.

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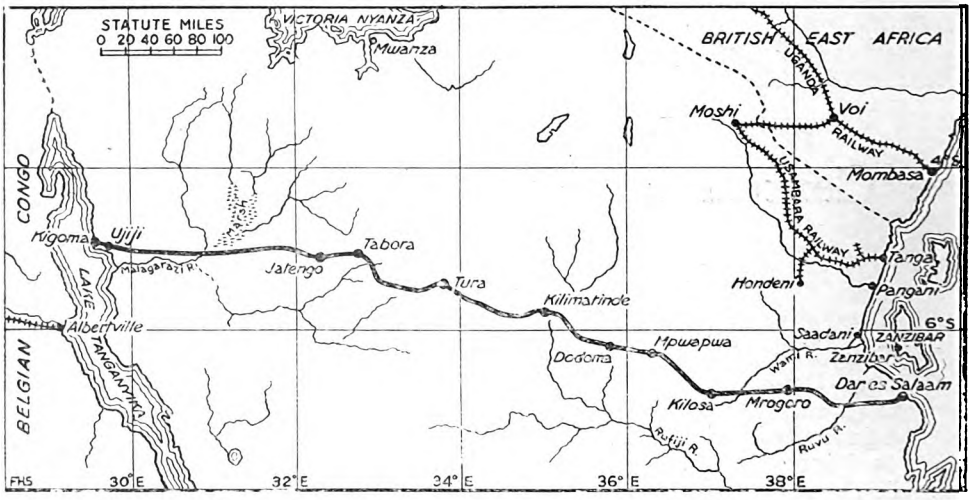
Tabora, the most important place on the line, excepting the termini, is 4,000 ft. above sea level and 530 miles from Dar-es-Salaam, which place it at one time rivalled for the distinction of capital. It is the centre of many trade routes, the most important, next to the Central Railway, being a motor road to Mwanza on Lake Nyanza, which will without doubt be supplemented by a railway in the near future. Should this vast country remain in British possession, it is practically certain that the Cape-to-Cairo railway will pass through Tabora, which will begin to lay claim to the title of "The Clapham Junction of Africa" which has been prophesied for it.

From Tabora the line falls steadily to the chief products, would naturally form the bulk of the goods traffic in normal times.

The track is laid to the metre gauge, and is single, except at stations and passing places. To reduce construction costs, cuttings have been made as shallow, and embankments as low, as possible. The result is that the line winds about a good deal, and there are fairly stiff gradients. Between Morogoro and Dar-es-Salaam, 1 in 50 is the ruling gradient, but beyond Morogoro there are steeper climbs than this. The line is extremely well ballasted, a hard grey stone of volcanic origin being largely used. Great attention has been paid to drainage, one of the chief considerations in tropical railway work.



MAP SHOWING CENTRAL RAILWAY FROM DAR-ES-SALAAM TO KIGOMA.

Kigoma, crossing the Malagarassi River at 670 miles by a bridge of 21 spans. Kigoma, on the shores of Lake Tanganyika, is likely to become the chief port of that inland sea. It was at Ujiji, four miles from here, that Stanley found Livingstone in 1871. During the recent war the line west of Tabora was occupied by Belgian Forces from the Congo, and has been administered by them since September, 1916.

Since 1915, the line has been practically monopolised by military traffic, but water and wood fuel trains have been run for the supply of native centres, as in German times. Tobacco, cotton, sisal-hemp, copra, rubber, cattle, and small quantities of gold, silver, mica, and quicksilver being

Wide cesses are formed on each side of the ballast, and are much used by the natives as footpaths, being naturally better than the ordinary bush path, and the quickest way between any two villages lying anywhere near the track. There are extremely few overbridges, and no tunnels, but the quantity of underbridges and culverts more than makes up for this. It is strange, in the dry season, to travel over the line and note a huge culvert with massive wing walls, spanning what merely looks like a bare depression in the bush; or to rattle over a girder bridge of 40-ft. span and see nothing but a trickle of water below. The same trip made in the wet season, however, soon explains these apparently unnecessarily extensive

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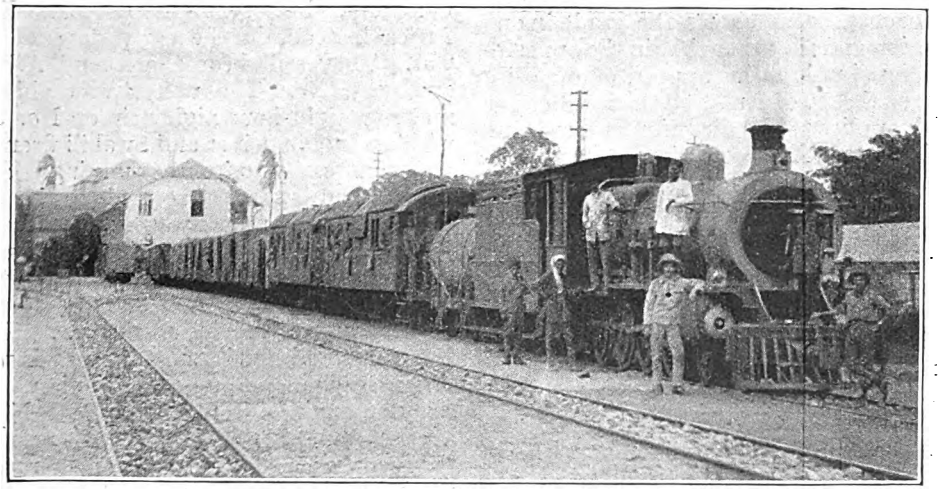
structures. Through what was a dry channel in January, a considerable stream rolls along in May, and the trickle of water which made the bridge look ridiculously huge, has become a roaring torrent carrying all before it. Near the coast, bridge abutments and other masonry structures are built of coral blocks, which, although light, seem to wear well. Up country volcanic rock is largely used.

There are long stretches of line along which good water cannot be obtained. It is usual for the engines to run with an auxiliary water tank, resembling the small oil tanks on four-wheeled trucks, which are used on the home railways, and this is connected to the water tank in the tender by a flexible connection. There are special water trains, consisting of anything up to a dozen of these tanks, which distribute water at various depôts along the line for the benefit of the native population. The women come to these roadside depôts and draw the water in gourds, or, since the advent of the British troops, empty petrol tins.



BRITISH LOCOMOTIVE AND TRAIN AT DAR-ES-SALAAM.

The standard rail is a flat-bottomed one, being $4\frac{1}{8}$ in. deep and $3\frac{5}{8}$ in. over the bottom flange, and weighing about 42 lb. per yard. These rails are laid in lengths of 28 ft., the joints being paired, and rest on dished steel sleepers, there being 14 to each rail length. The sleepers are 6 ft. $5\frac{1}{2}$ in. long, $9\frac{3}{4}$ in. wide over all. They are about 3 in. deep over all, the thickness of the metal being $\frac{1}{4}$ in. The ends are turned down and the corners slightly splayed out. The rails are secured to the sleepers by tie plates, a hook on the underside of each plate gripping the sleeper through a square hole in the top of the latter. A square shanked bolt completes the fastening. Fishplates, which are 2 ft. $3\frac{3}{8}$ in. long, have four holes for $\frac{3}{4}$-in. bolts, are carried over two sleepers, and are notched to clear the tie plates. The bolt heads are on the outside of the track.

The point and crossing work on this railway differs from British practice in minor respects. The frog, or V of the crossing, instead of being formed by the splicing of the point and splice rail, is a steel casting, with the broad end so formed that the converging rails butt up squarely against it. Switch tongues are short, due in part to the narrower gauge, several which were measured being 10 ft. 7 in. with a 3-in. heel clearance. The points are all worked by tumblers.

The line is well provided with distance and gradient indicators. Distances are measured in kilometres, and every tenth of a kilometre is marked. For this purpose, small stones are used, about 8 in. square, and projecting a foot above the ground. They are set with one edge towards the track, and are canted back, being marked on two faces, so as to be visible when approached from either direction. Stones marking even tenths

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are set on the right-hand side of the track; those marking odd tenths on the left-hand side, going west. The top figure on the stone gives the distance in kilometres from Dar-es-Salaam, the lower figure giving the additional tenths. Thus a series of stones would read say

$$\frac{211}{6}\ \frac{211}{7}\ \frac{211}{8}\ \frac{211}{9}\ 212\ \frac{212}{1}\ \frac{212}{2}$$

and so on.

The gradient posts are quite distinctive, and are altogether different from those in use in this country. They are set on the right-hand side of the track, going west, and the arms, which are both on the same side of the post, project from it towards the track, and so face the driver as he approaches. One shows the grade in one direction and the other that in the opposite direction, but lettering appears on opposite sides of the two arms, so that only that which applies to the direction of travelling is visible. An inscription of, say, 20% 525 m. indicates a rise of 20 per 1,000, *i.e.*, 1 in 50, for 525 metres. Thus not only does the driver know the gradient he is running on, but he knows how far it extends. The tangent points of many of the curves are marked by a small board stating the radius of the curve in metres. A small tin disc, set on a post, and marked with a letter L, gives warning of a level crossing; these, of course, are mostly quite open and unprotected, in common with the rest of the track. Telegraph wires are carried on posts consisting of channel iron, set on the left-hand side, going west.

The heaviest locomotives which the Germans had running on this line were of the 4-8-0- type, built mostly by A. Borsig, of Berlin, but there were also tank engines of the six-coupled type with a leading pony truck. Most of the locomotive stock was smashed up by the Germans in their retreat. At Mikesse Bridge one of the spans was blown up, five trains were run through the gap and into the chasm below, and then the remainder of the bridge was demolished. Stationed at Dar-es-Salaam was one of the 4-8-0 locomotives, with outside cylinders, built by A. Borsig at Berlin in 1912. It had been salvaged from one of the wrecks up the line, the first step in the operations being the smoking out of the bees which had established themselves in the cab. It was a typically Continental product, with its sand dome on top of the boiler, wide firebox extending over the frames and with sloping back plate, blower pipe outside the funnel and extending to the same height, and generally complicated appearance. An Indian foreman testified to the good running of these engines on the level or a down grade, but on an up grade they are greedy for steam. He said they would run for ever, a solution, one would think, of the locomotive shortage problem. The boiler plates of these engines are only half the thickness of those of one heavy class of British locomotive using the line. This is a 4-8-0 outside cylinder type originally built for the Assam–Bengal Railway, by the North British Locomotive Company, but sent to German East Africa instead, in the early days of the war. They still bear the legend A.B.R. 124, 125, &c. The writer was able to make an eight-hour night trip on No. 128, with an Indian driver and Swahili fireman, and can testify to its free running. Simplicity and strength seemed to be the leading features; there was no superheater, but steam was kept up without difficulty. A similar class of locomotive, built by Nasmyth, Wilson & Co., of Patricroft, is also doing good service on the line. They are numbered 1096, 1097, &c., and were originally built for one of the Indian lines. Smaller engines from the Bengal North Western and South Indian Railways are engaged on the lighter trains, and shunting work. At Dar-es-Salaam, besides the main station in the town, there is a line starting some distance back, and running down on to the wharf, with a considerable number of sidings. On these, during the daytime, could usually be seen one or other of the two 0-6-0 tender engines (originally built for the Burma Railways, on which they had seen considerable service) and now performing shunting duties. In 1918, coal was so scarce at Dar-es-Salaam that practically all the engines were running on wood fuel, a good deal of it being ebony, although not the best commercial variety. There was probably nothing else suitable within easy reach. Difficulty was experienced in many cases in keeping steam up, as the engine grates were not designed for wood fuel.

The bulk of the rolling-stock consists of ballast trucks, flat trucks for carrying timber, and steel box cars. These are all

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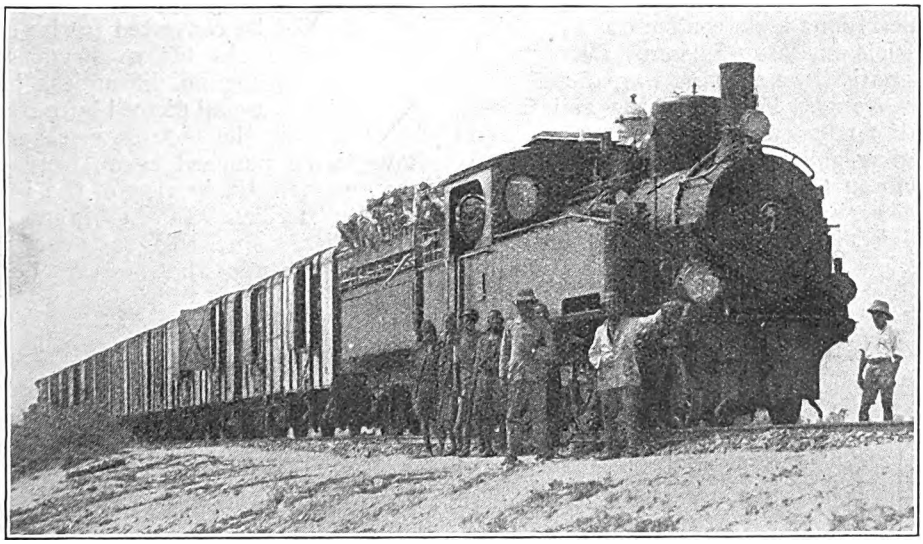
four-wheeled, and, except for the box cars, have a screw-down brake, operated from a platform at the end of the truck. The box cars have the usual side lever brake apparatus. Most of the vehicles are piped for the vacuum brake, although they are not fitted with it. The passenger coaches, which are mounted on bogies at each end, are about 50 ft. long. They are divided into first-class and ordinary. The upper parts of the sides consist of wood louvres to secure good ventilation, while in most cases mosquito netting is fitted in the window frames instead of glass. Access is obtained from an observation platform at each end of the coach, which also enables through communication to be maintained along the train. The coaches are varnished and have the natural wood finish so characteristic of the Great Central Railway at home. Most of the rolling-stock was built at Nurnberg, in Germany. Instead of the two buffers and separate coupling we are so familiar with, the combined centre buffer and hook with volute spring attachment are universal on this line. One of the British drivers who was doing duty during the British occupation, had a narrow escape, due to the breaking of the coupling between the tender and the auxiliary water tank. The engine, and driver with it, went down one side of an embankment and the water tank down the other, luckily without fatal results. There is a tremendous stress on these couplings, and breakages, with more or less serious results, are fairly frequent. In addition to the above-mentioned stock there are a few petrol-driven rail-inspection cars, which are capable of attaining considerable speeds, and there are also a few push trolleys.

The driver stands on the right-hand side of the foot-plate. There are practically no signals, important places, such as turnouts from single to double track, being marked at night by a lamp which is turned by an attendant, usually a native, to show either red or green, and controlled by flags in the daytime. The lamp or flag man gets his instructions in writing from the stationmaster, as it is only near stations that any lamps or flags are used. The driver, on pulling up at a passing place, receives a paper from the train despatcher or stationmaster, which tells him how far ahead he has line clear, where his next stopping place will be, whether or not he has to pick up or leave vehicles there, and where he has to pass the next train in the opposite direction. Communication between the stations is by telegraph, there being no block instruments. As in India, the 24-hour clock is used, running from midnight to midnight. One soon gets used to the 5 p.m. train from so-and-



A GERMAN LOCOMOTIVE AND TRAIN.

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so being called the train which leaves that place at 17 hours. Often one train will be sent after another, before the first one has cleared the section, a time interval of 5 min. being specified as a minimum. The driver previously mentioned was in charge of a water train one day, and had stopped to replenish a wayside tank. Another train, following him up closely, started down a steep bank which terminated at the tank, before the first train was observed, the result being a collision which strewed water tanks all over the line. Presumably, such risks would not be taken with a passenger train, and I never heard of a head-on collision. A school for natives, who are Swahilis by nationality, was started under British supervision and conducted by British officials, in Dar-es-Salaam. Here, promising natives were taught to read and write, then taught English words and figures, and finally were given instruction in sending and reading Morse by telegraph. While at the school these "boys" (every male native is called a "boy") were housed and fed in huts quite close at hand. In the first trial six weeks of the school, nine natives were turned out who could send and receive a train despatcher's report, in English, on the telegraph, an eloquent testimonial to the instructors no less than to the students. There should be no great difficulty in filling all the lower railway grades with natives. They are firing on the engines now, with Indian drivers, and are quite capable of conducting shunting operations at least.

We are not far from the day when connection will be established between those railways in Africa which run roughly east and west and the Cape-to-Cairo line. This line will be laid to the 3 ft. 6 in. gauge; the railways on the Union of South Africa are 3 ft. 6 in. gauge, and so are the Portuguese lines and the Uganda Railway. The metre gauge Central Railway will have to give way before this vast mileage, and be converted to the slightly wider gauge. As far as structures go, this will involve no difficulties, but the steel sleepers are all pierced by rectangular holes to suit the metre gauge, and will have to be punched again, or replaced, not a great task, in view of the immense benefits derived. In the great future which lies before this vast country, in whatever hands that future lies, the Central Railway will play a leading part.

LLANELLY AND MYNYDD MAWR RAILWAY.

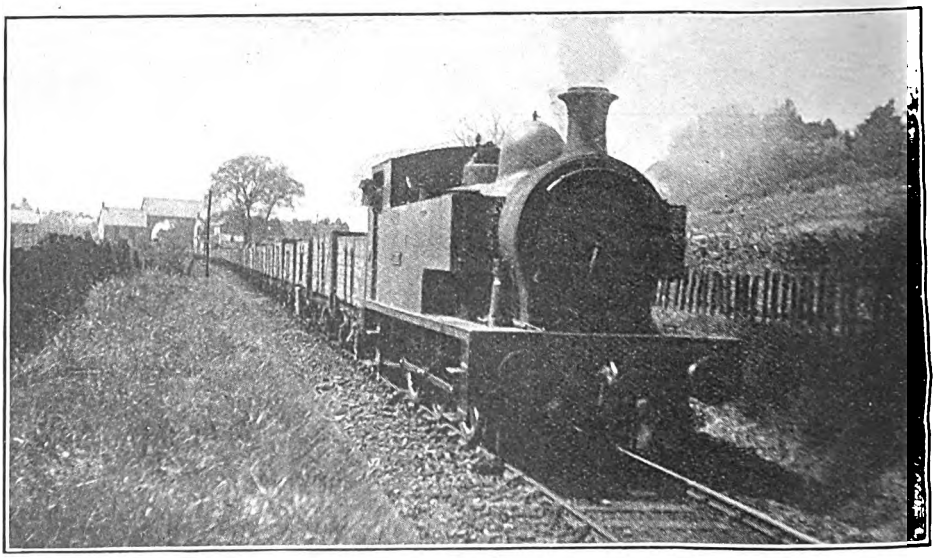

Photo.] [*K. A. C. R. Nunn.*

Llanelly-Crosshands goods train ascending incline. 0-6-0 Locomotive "Kerkland." Banked in rear by engine "George Wardell."

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Locomotive and Train Working in the latter part of the 19th Century.

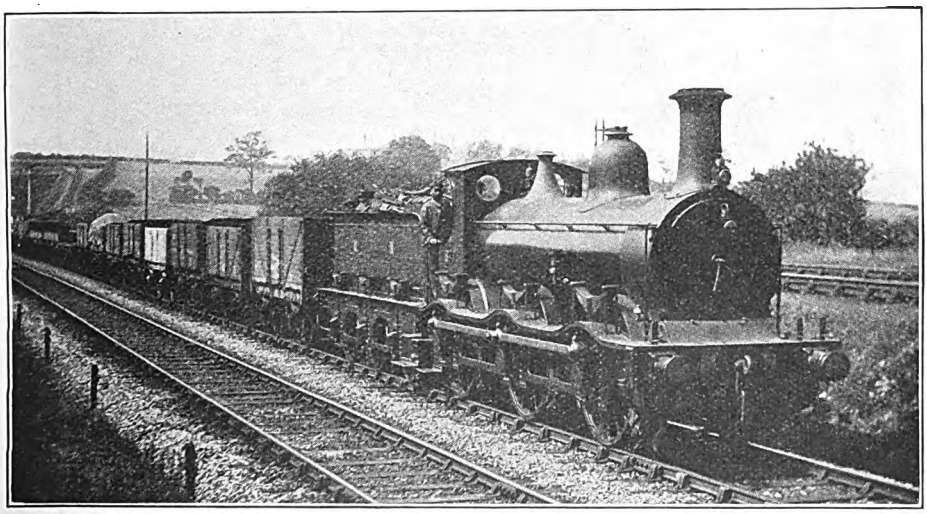
MIDLAND RAILWAY. [No. VIII.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

NOTTINGHAM is the largest locomotive depôt on the Midland, and has always included in its stock almost every class of engine on the line. The main line engines and working have already been described, and in addition an army of 2–4–0 engines run in all directions radiating from Nottingham. The most intricate locomotive working was, and is, that performed by some 30 to 35 0–4–4 bogie tank engines which work over the network of Nottinghamshire and Derbyshire branch lines. The majority of these engines are stabled at Mansfield, and they work round in turn over some 182 miles of railways and about 20 different train services. The Mansfield-Sheffield route, *via* the Lancashire, Derbyshire and East Coast (now Great Central) Railway was not introduced until 1905. There used also to be a service of three Midland trains daily to Retford over the Great Central line, but at the end of the nineteenth century this had been reduced to one each way, and this solitary survivor has since been discontinued, as also have the Mansfield and Ollerton direct trains more recently. Truly the Mansfield drivers get plenty of variation, and have to learn a good many roads.

Birmingham is also another centre for tank engines, but the working here is not of the complicated character of that just mentioned, and consists of the heavy "roundabout" suburban service on the Kings Norton lines, and the trains on the Walsall branch. The Redditch trains were formerly worked entirely by tender engines of the old 80 class, but are now in the hands of 0–4–4 tank engines.

I have already given some details of the Bradford and Leeds district. Until near the close of the century there were four roads from Bradford to Shipley only, and another mile east of Shipley as far as Thackley signal box, but the whole line



GOODS TRAIN NEAR ROMILEY JUNCTION.
Rebuilt 0-6-0 engine No. 877.

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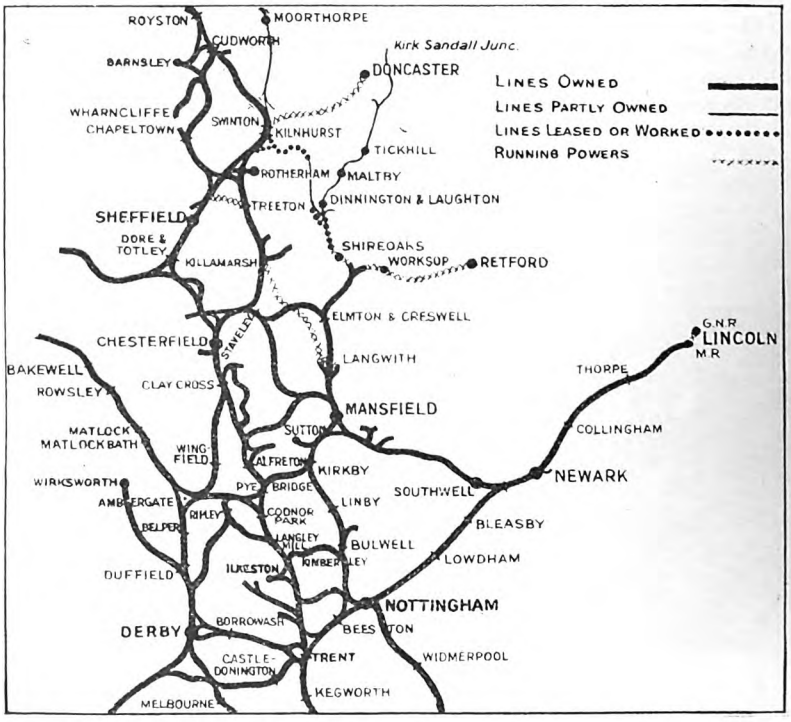
between Bradford and Leeds, has since been doubled with four roads throughout, and it needed it badly. It would have been doubled long before, but for the existence of the long Thackley tunnel between Apperley Bridge and Shipley.

In the summer of 1889 the Midland opened an important cross-country branch from Ilkley to Skipton, through the Bolton Abbey district, and initiated a new service of trains from Colne to Harrogate, which, however, has since become defunct. The heavy trains up the 1 in 60 banks to Guiseley.*

In the afternoon of June 9, 1892 a very bad accident occurred at Esholt Junction, near Guiseley. The junction is situated on a 1 in 60 fall from Guiseley, and a train from Ilkley to Bradford was passing over it when it was cut into by an express from Leeds to Ilkley, drawn by engine 179, which had run past all the signals and charged up the 1 in 60 bank in spite of the gradient.



MIDLAND RAILWAY ROUTES IN THE NOTTINGHAM, DERBY, MANSFIELD AND SHEFFIELD DISTRICTS.

Lancashire and Yorkshire now run certain trains over this line to Ilkley in the summer.

The Bradford–Ilkley business trains, which cover the 13¾ miles in 20 minutes, put the 0–4–4 tank engines on their mettle, for the road abounds in stiff banks, and as a locomotive performance the 20 minute run is by no means easy work. Formerly the Ilkley trains were worked by the 2–4–0 double-framed engines 157 to 159, which were quartered at Ilkley for many years, and did some wonderful climbing with

A little known branch on the Midland is that which runs up from Lancaster (Green Ayre) Midland Station to the London and North Western Railway Castle Station, on which two or three passenger trains from Skipton used to run. Another branch which belongs to the Midland, from Hawes Junction to Hawes, is worked entirely by the North Eastern local

* For particulars of these engines see the RAILWAY MAGAZINE for May, 1919, pages 324 and 325. An illustration of one of the class, No. 116A, is given on page 324.

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passenger trains from Northallerton, although the Midland runs a daily goods train to Hawes.

It has previously been mentioned that the Midland connection with its Swansea Vale railways was made by means of running powers over the Neath and Brecon Railway between Brecon and Ynisygeinon Junction. About 1888 signs of trouble began to show themselves in this region, for the Neath and Brecon had a grievance that the Midland paid much too little toll for the use of 29 miles of Neath and Brecon line. The amount certainly seemed small, and possibly there may have been some justification for dissatisfaction. Evidently all the materials were ready for a fight, but one thing was then lacking, viz. :—somebody to begin it. The Neath and Brecon people were not too anxious to start the battle against their powerful "friends," and the Midland people, who were fairly peaceable within certain limits, imitated "Brer Rabbit," and "lay low and said nuffin." Consequently, the old agreement between the two companies, which was to expire on June 30, 1888, was temporarily renewed for 12 months.

Now no railway trouble during the latter part of the nineteenth century was considered to be either properly stage-managed or complete without the assistance of that stormy petrel of the railway world, Sir Edward Watkin. Even if he started as a spectator it did not seem long before he was in the centre of the ring, going for one or perhaps both of the original combatants. Whether he scented a fight in South Wales and came along "on his own" to take a hand, or whether the Neath and Brecon directors had been looking round for a champion pugnacious enough to put the gloves on for them, did not appear. But what did appear in March, 1889, was an announcement that Sir Edward had been made a director and the chairman of the Neath and Brecon Company. This was quite sufficient. After some preliminary manœuvring for position, on June 26, four days before the renewed agreement was due to expire, the following notice was posted at the Midland and Neath and Brecon stations :—"As the Midland Railway Company's agreement for working the Neath and Brecon line between Brecon and Ynisy-

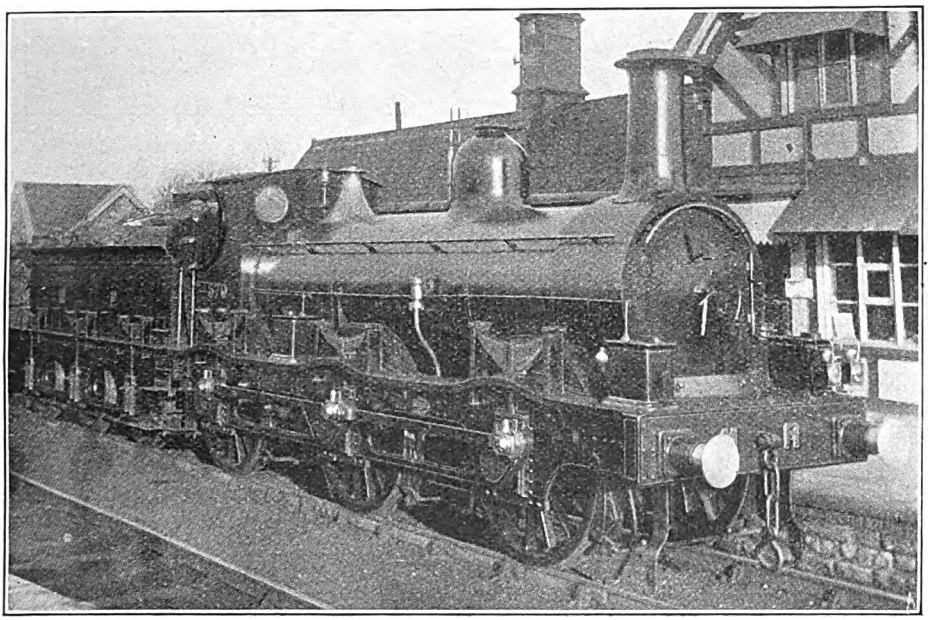

Photo.] REBUILT 0-6-0 ENGINE No. 570. [*G. Milne.*

On goods train at Clapham, Yorks, 1895. Coupled wheels, 5 ft. 2 in. diam. Cylinders, 17 in. by 24 in.

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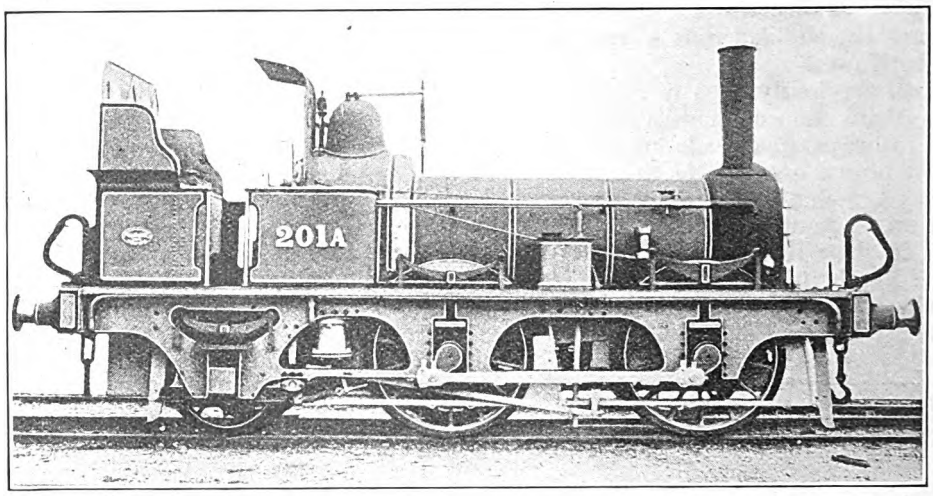

0-4-2 TANK ENGINE No. 201A. (200A CLASS.)

Rebuilt from old "Little North Western Railway" (Skipton and Lancaster) locomotive built by Fairbairn and Co. Coupled wheels, 5 ft. diam. Cylinders, 12 in. by 18 in.

geinon Junction will expire on the 30th inst. the Midland Company's passenger service over that line will be discontinued after that date."

The Neath and Brecon, as in duty bound, tried to work the traffic. This was a very difficult proposition for them, since they possessed only one passenger and four goods tank engines all told, and these were required for the service between Neath and Colbren Junction. They, therefore, borrowed stock from the Manchester, Sheffield and Lincolnshire Railway, of which line Sir Edward Watkin was also the presiding genius. How much passenger traffic they actually succeeded in working, I do not know, but it must have been an exceedingly "thin" train service. All time tables for July 1, which I saw, indicated "No service," and a great deal of walking was done in that part of South Wales. Eventually, after a stoppage of nearly one month, somebody thought it might be better policy to do something in the way of negotiation, with the result that the Midland resumed the passenger service. The two companies agreed to discuss their differences before an arbitrator, and I believe the Neath and Brecon obtained a modest solatium, about one-third of what they claimed.

To work the passenger service between Hereford and Swansea there were four 0-4-4 bogie tank engines, 1734-6 at Brecon, and 1737 at Swansea. The latter engine made a daily trip from Swansea to Hereford (Barton) and back. The Midland through carriage from Birmingham to Brecon and Swansea was conveyed by the Great Western train from Worcester to Barr's Court Junction, Hereford, where it was detached, and a very small Midland tank engine, No. 200A, originally derived from the Little North Western Railway, as the line from Skipton to Lancaster used to be called, took the coach over the connecting line to Barton Station, where it was attached to the Swansea train. Nowadays the Great Western allows the Midland the use of Barr's Court Station, and the services of the small engine are no longer required.

In 1892 Mr. Johnson enlarged his 4-4-0 engines by increasing the coupled wheelbase from the 8 ft. 6 in. length, which had been standard from 1862, to 9 ft., to enable a longer firebox to be used. The new engines, Nos. 2183 to 2202, were built by Sharp, Stewart & Co., and in 1896, five more, Nos. 156 to 160, were built at Derby. They had 7 ft. coupled wheels, 18½ in. by 26 in. cylinders, and 160 lbs. working pressure. The firebox heating surface was 117 sq. ft., and the total 1,223 sq. ft. Of these engines 2183 to 2192 and 156 to 160 were for many years stationed at Nottingham to run to Leeds and Manchester, and the Nottingham men

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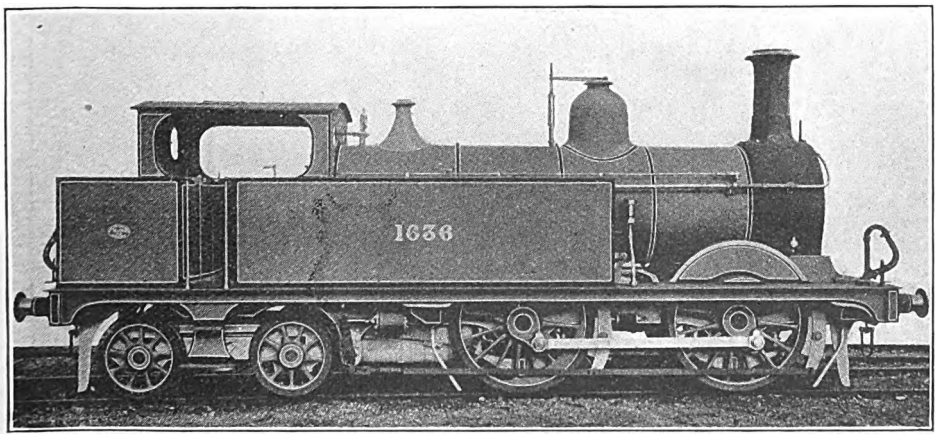
shortly afterwards worked one of the Scotch expresses in each direction, with these engines, as far as Hellifield. Of the others 2193 to 2197 were at Birmingham, and 2198 to 2202 at Bedford, and remained at these stations until a few years ago. These engines and all that succeeded them until the end of Mr. Johnson's time had the drum-head, flush smokeboxes of the same pattern as the "singles."

Five more of the latter came out from Derby in 1893, in which the driving wheels were 7 ft. 6in., but the cylinders were increased in size to 19 in. by 26 in., with piston valves—the first to be used on the Midland. The new engines, which carried 160 lb. pressure, were Nos. 179 to 183, and in 1896 five similar engines, Nos. 75, 76, 77, 79 and 88, were built. Although they ran for a time on the London road, most of their work has been done on the Bristol route, where some of my experiences of 180 caused me to think it was nearly the fastest running engine on the Midland. Nos. 79 and 179 were, however, retained at Nottingham for the London expresses. The present numbers of these ten engines are 660 to 669. Engine 79, piloted by the 4-4-0 engine 157, accomplished a fast run from Nottingham to London with 260 tons. From Nottingham to the Kettering stop—51¾ miles—was run in 56¼ min., at an average speed of 55·2 m.p.h., including the slack for Melton Junction. From Kettering to Kentish Town the 70½ miles was covered in 75¼ min.—speed 56·35 m.p.h. The total time made up—the train being 16 min. late from Nottingham—was 10½ min.

One of the smartest performances within my own experience was accomplished by engine 76 on a fast stopping train—the 1.30 p.m. from Birmingham to Derby. The load was 130 tons, and No. 76 ran from Tamworth, dead start, to the Barton and Walton stop, 9 miles in 9 min. 40 sec., a running average of 55¾ m.p.h., which must almost constitute a record for such a short run with a stopping train. I had several extremely good records with Bristol engine 180 of this class, of which I remember a run from Birmingham to Burton, 31¼ miles with the slack round the old curve at Whitacre Junction, in 32½ min. The train was a heavy one, but I cannot, when writing, find the notebook containing the details of this run.

In 1893 a most important new line was opened, viz., the Dore and Chinley, which gave a long needed connection between Sheffield, and the other Yorkshire stations of the Midland, and Manchester, Liverpool, &c. From this time the Midland fast goods trains between Bradford, Sheffield and Liverpool, which had hitherto run over the Manchester, Sheffield and Lincolnshire Railway from Barnsley, quitted this route for the new Midland line. In later years, during the present century, the Dore and Chinley served as an admirable alternative route for the Manchester-London



STANDARD 0-4-4 PASSENGER TANK ENGINE No. 1636, PERIOD 1881-1886.

Designed by Mr. S. W. Johnson. Coupled wheels, 5 ft. 3 in. diam. Cylinders, 17 in. by 24 in. Steam pressure, 140 lb. per sq. in. No. 1636 was the last tank engine to be painted green.

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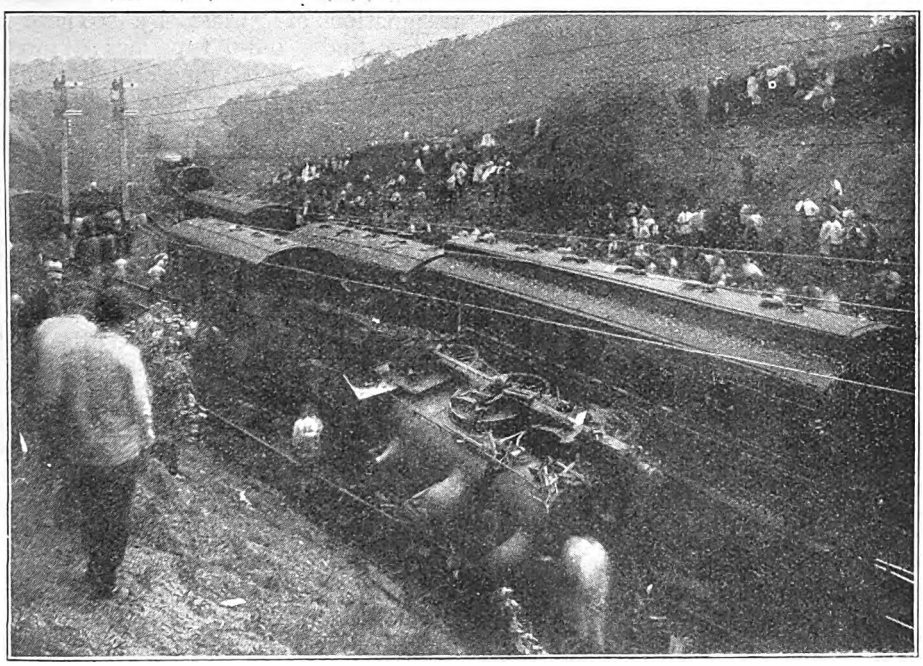
Nottingham trains. Nos. 2213 to 2217 were sent to Manchester after one or two had been tested between Leeds and Carlisle. Manchester, however, thought that they were too good for the short runs to Sheffield, and put them on to the London expresses to Leicester, on which service they were employed for a number of years. Instead of the new engines two of the older 4–4–0 engines, Nos. 1342 (7 ft.), and 1666 (6 ft. 9 in.), were almost invariably used between Manchester and Sheffield.

shed shortly afterwards had to work a Scotch express to Nottingham, on which these engines were used.

Generally speaking, the engines of this class never seemed to me to run as freely as the 1740 and other 4–4–0 engines of the Midland; they gave one the impression of having their legs tied together. Nevertheless, there were occasions when they asserted themselves. I have one instance in which 2216 took a train of 195 tons from Leicester to Derby—the line being of



RAILWAY COLLISION, ESHOLT JUNCTION, JUNE 9TH, 1892. ENGINE No. 179.

From a copyright photograph published by A. Dobson, Shipley, and H. Cooke, Guiseley.

As a result of the trial of the 2203 class on the Carlisle road, 30 more of the class were built at Derby, of which Nos. 184 to 199 (1894) went to Carlisle and replaced the 1572 class there. Engines 161 to 164 (1894) were sent to Leicester and ran chiefly to London and Leeds, and also frequently to Manchester. Of the ten engines which followed in 1895, Nos. 230 to 235 were stationed at Leeds, and 236 to 239 at Hellifield. The men at the latter

a very level character throughout—in 32½ min., at an average speed of 54·5 m.p.h. My experiences with these engines were, however, confined to the Leeds—London and Manchester—London trains, and I never had the opportunity of timing any of the Carlisle engines 184 to 199 over the North Yorkshire and Westmorland hills. I regret this, for if the best was to be got out of them the Carlisle drivers of last century were the men to do it.

(To be continued.)

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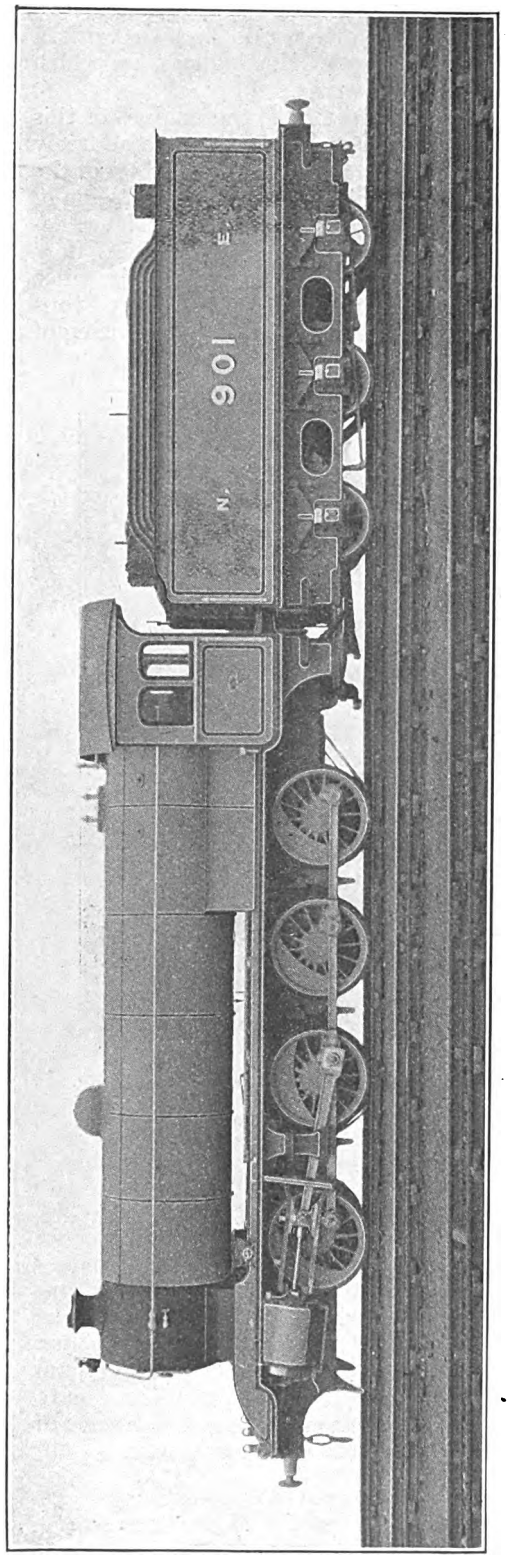

THREE-CYLINDER 0-8-0 MINERAL LOCOMOTIVE, NORTH EASTERN RAILWAY.

TO Sir Vincent Raven, K.B.E., Chief Mechanical Engineer, North Eastern Railway, we are indebted for a photograph and particulars of a new class of engine recently completed at Darlington Works, under the designation of "Class T3." These are three-cylinder 0-8-0 type heavy mineral locomotives with superheated boilers. The three cylinders and valve chests are formed in one casting, the steam chests being common to all three cylinders. The cylinders have a diameter of 18½ in. and a piston stroke of 26 in., the wheels being 4 ft. 7¼ in. diam. and spread over a wheelbase of 18 ft. 6 in. Working pressure of the boiler is 180 lb. per sq. in., and at 85 per cent. of this pressure the tractive force exerted is 36·963 lb. Total heating surface is 2,094 sq. ft., including the Schmidt superheater.

Locomotives of this class are fitted with self-trimming tenders, having a capacity of 5½ tons of coal and 4,125 gall. of water. In working order the engine weighs 71 tons 12 cwt., the tender in a similar condition weighing 44 tons 2 cwt., the total weight of engine and tender thus being 115 tons 14 cwt.

Designed and built for dealing with heavy freight traffic and with a capacity sufficient for hauling mineral trains up to 1,400 tons weight on a gradient of 1 in 200, the engines are being put into traffic in the Newcastle district and represent a very modern development of a class which has proved its merit on British main lines. Adoption of a third cylinder permits of a superior tractive effort, improves the accelerative qualities and ensures a greater equalisation of driving forces.

Sir Vincent Raven states that he is building another new class of engine at Darlington which is a duplicate in every possible respect of the new mineral locomotive illustrated, except that the wheel arrangement will be 4-6-0 with coupled wheels 5 ft. 8 in. diam.; the engines are for fast goods traffic.

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Organisation of the Ministry of Transport.

IN many Ministries the whole of the executive work is done through the Secretary, who alone is responsible to the Minister; but in the case of the Ministry of Transport there are, excluding the Consulting Mechanical Engineer (Sir John Aspinall) and Ireland, eight principal officers, each responsible direct to the Minister for the work of his department. To secure close co-ordination between the sections of a department and between the various departments, a number of Assistant Secretaries have been appointed. These eight departments of the Ministry are:—Secretarial and legal; Mechanical engineering; Civil engineering; Development; Traffic; Finance and statistics; Public safety and general purposes; and Roads.

Secretarial.

The Secretary is responsible for the general organisation of the Ministry, and through him all reports to the Cabinet will be made. All appointments are made through an establishment officer in the secretariat. The Secretary is also Solicitor and is responsible for giving legal advice to all the officers of the Ministry.

Mechanical Engineering.

The mechanical engineering department is at present divided into four sections: (1) Railway locomotives and rolling-stock; (2) stores and works; (3) dock and harbour plant; and (4) signals and trams. The organisation of the civil engineering department is not yet complete.

Development.

The development section is an entirely new departure, and its work will be watched with considerable interest. It is difficult to find an exact analogy; but probably the functions will in time be to some extent similar to those of the Industrial Commissioner on American railroads. The department has two main sections—plans and intelligence. This department will require to keep in touch with all developments of trade, agriculture or housing, and by means of its intelligence branch be prepared to anticipate demands likely to be made on transportation. It will also have to obtain from the technical departments detailed schemes for carrying out the various suggestions so that the Minister can be in a position readily to determine the best and most economical means of supplying the necessary facilities.

Traffic.

The traffic department is concerned with all questions of movement, whether by rail, road or canal, and also the facilities at the ports. The allocating of traffic to the most suitable method of transport will largely fall on this department, which will also be responsible for seeing that causes of congestion are promptly studied and investigated with the authorities concerned.

Finance and Statistics.

The finance and statistics department is divided into four sections: finance; accountancy; rates, fares and charges; and statistics. The finance section is responsible for the preparation of the estimates each year and for making all payments. The proposals of all departments will be scrutinised from the financial point of view in this section, as it is its business to see that the amount voted each year is not exceeded, and also that in all cases the necessary authorisations have been obtained.

The accounting section will scrutinise the accounts of all controlled and non-controlled undertakings, and is responsible for the accuracy of the various claims made against the Ministry. The figures of the results of railway working published from time to time will be prepared in this section. A sub-section, to be located with the Director-General of Roads, will scrutinise the accounts of road authorities to whom assistance is being rendered, and also to certify all claims before payment is made.

The rates, fares and charges section is a most important one. It will obviously have to keep in the closest possible touch with the Rates Advisory Committee, of which Mr. Gore Browne, K.C., has been appointed Chairman; but the general

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revision of the classification and bases of rates must necessarily make heavy demands on this section.

The statistical section will collate and study statistics relating to all forms of transportation, and will be responsible for preparing for publication all railway statistics formerly published by the Board of Trade, with such additions as may be agreed upon.

Public Safety and General Purposes.

The department of public safety and general purposes performs many duties transferred from the Board of Trade, the chief of which is the duty of inspection of new works and alterations from the point of view of public safety. This department is also charged with the responsibility of dealing with questions of rates of pay and conditions of service of the employees of controlled undertakings.

Roads.

Last, but by no means least, is the roads department, which by statute must be a separate department. The new organisation of this department is not quite complete, and it is hoped to publish it later. One of the most important of its functions is the classification of roads, which was commenced by the late Road Board. The work is vital if the responsibility for good main roads is to be equitably apportioned between the State and local authorities.

AT OLD OAK COMMON.

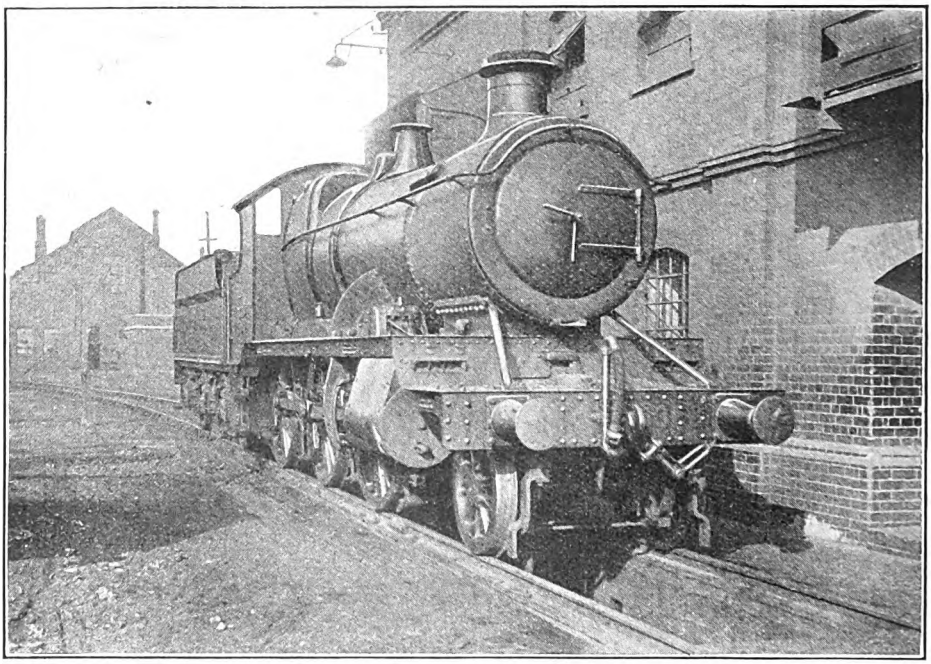

Photo.] [*Chas. S. Lake.*

GREAT WESTERN RAILWAY.

2-6-0 Locomotive at Coal Stage.

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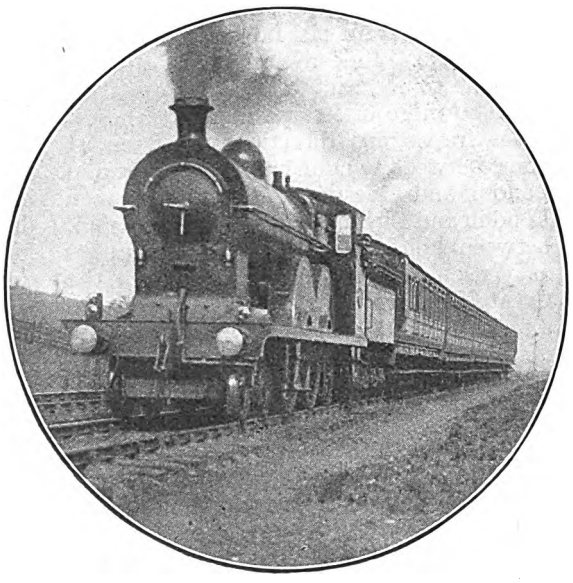
British Locomotive Practice and Performance.

By CECIL J. ALLEN.



LANCASHIRE AND YORKSHIRE RAILWAY.

Blackpool to Manchester express passing Blackrod.

IT must be confessed that the October time-tables of the bulk of our main lines were distinctly disappointing. In only one or two cases has the cessation of the heavy summer traffic led to any improvement worth mentioning in the train times. There are practically no alterations in the main line train services of the Great Western, London, Brighton and South Coast, London and North Western, Great Central, Great Northern, North Eastern, Lancashire and Yorkshire, and the Scotch and Irish railways. On the other hand, however, quite a number of trains appearing for the first time in the improvements which came into force between May and July remain permanently included in the time-tables. In this category may be mentioned the 11.30 a.m. and 3.30 p.m. West of England expresses *ex*-Paddington, Great Western Railway, with their corresponding up trains due at 1.45 and 4.15 p.m. (while the 10.30 a.m. down "Limited" retains its non-stop run to Plymouth), and the much improved Great Western Birmingham service, with its four down and five up 2½-hour trains; the 11.35 a.m. Victoria–Fratton non-stop Pullman express on the London, Brighton and South Coast Railway; the 1.40 p.m. from King's Cross to Harrogate, and the return train due at 5.30 p.m., as well as the reinstituted afternoon "Scotsmen" on the Great Northern Railway and associated lines. Certain other important trains were continued till the end of October, while the London & South Western changes, details of which are not available at the time of writing, operate from November 16th.

No reduction is made in the somewhat lavish express train service north of Preston on the London and North Western Railway, practically the only alteration in the West Coast trains being that the 1 p.m. Glasgow express *ex*-Euston once again carries the Aberdeen and Furness line portions as far as Crewe, shedding them there for its non-stop run to Carlisle. The special Windermere and Keswick down express at 11.15 a.m., of course, disappears, and with it the 10.40 a.m. from Euston to North Wales, the Manchester portion of the former and the Llandudno portion of the latter being grafted on the 11.5 a.m. for Liverpool, which thus assumes somewhat colossal proportions. Nevertheless, the Euston-Crewe time is cut to 3 hours 20 min., but it seems rather remarkable—presumably in order that there shall be no reduction of the overall times of 4½ hours between London and Liverpool and Manchester

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respectively—that the North Wales portion of this train should be the first to leave Crewe. Indeed, indications all seem to point to the fact that we are settling down to more or less permanent "best" times in various directions, such as 4½ hours between London and Manchester and London and Liverpool; 2½ hours between London and Birmingham; 4 hours 20 min. between London and Leeds—this applies as yet only to certain up trains on the Great Northern Railway route, the 10.10 a.m., 1.30 p.m. and 5.40 p.m. down being easily capable of acceleration to the same figure—and 9 hours between London and Edinburgh. Of these only the last-named is, in my opinion, justified by circumstances; on the basis of present-day running on the Great Western Railway and Great Central Railway, and even such lines as the Great Eastern and South Eastern and Chatham Railways, Manchester, Liverpool and Leeds should not be more than 4 hours distant from London by the best express trains; Sheffield should be within 3 hours 20 min. at most, and Birmingham within 2¼ hours. Nine hours between Euston and Glasgow by the West Coast route would also appear an ample allowance. These times would, of course, entail the abolition of the remaining restrictions on maximum speeds.

But I must not overlook those companies who have effected some improvements of their services in the October time-tables. Another selection of trains is made by the Midland authorities for drastic time-cutting. The 9.40 a.m. down Manchester express starts at 10.15 a.m., omits all its four stops south of Leicester (which are made by a connecting train at 9.30 a.m. *ex*-St. Pancras), reaching there at 12.20 p.m., and Derby, as hitherto, at 1 p.m. Five minutes further acceleration between Chinley and Manchester makes a total of 40 min., and brings the train into Central Station at 2.50 p.m. Correspondingly, in the up direction, the 1.45 p.m. *ex*-Manchester abandons all stoppages on the London side of Leicester, and by running thence up to town in 125 min. arrives at 6.15 instead of 6.56 p.m. and saves 41 min. Manchester thus has now 13 nominal 4½-hour trains to and from London, at 10.15 a.m., 2.10 and 4.15 p.m. *ex*-St. Pancras; and 11.5 a.m., 2.35 and 5.30 p.m. *ex*-Euston; while in the reverse direction the times are 8.30 a.m.,

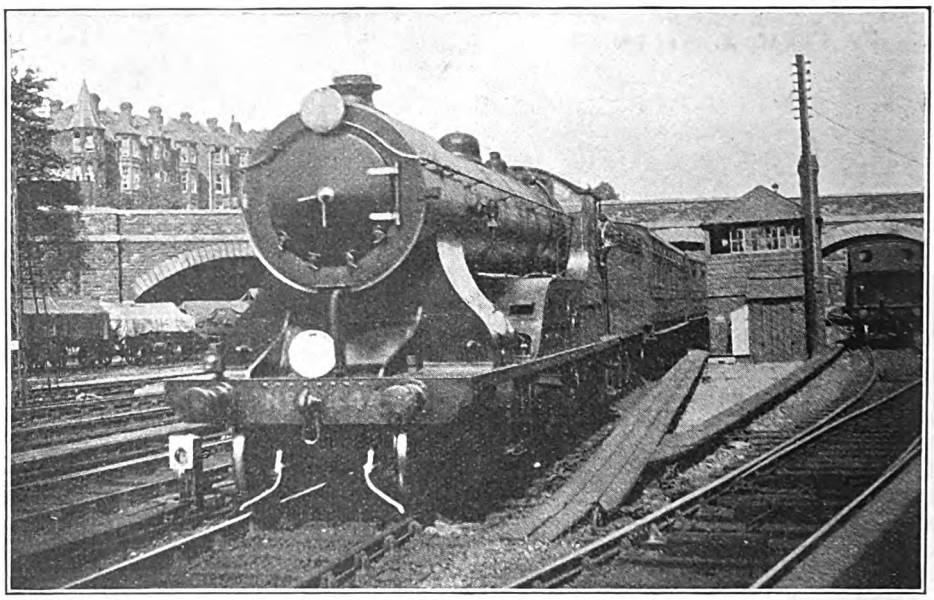

Photo.] LONDON AND SOUTH WESTERN RAILWAY. [*F. H. Stingemore.*

West of England express entering Queen Street, Exeter. Rebuilt Drummond 4-6-0 6 ft. 7 in. 4-cylinder Superheater engine No. 444.

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12.5, 2.5 and 4.10 p.m. *ex*-London Road, and 9.10 a.m., 1.45 and 4.5 p.m. *ex*-Central. Of these the 8.30 a.m. up takes 2 min., the 10.15 a.m. down, 5 min., and the 2.5 p.m. up, 10 min. over the 4½-hours limit. In addition there are the useful 3.15 p.m. *ex*-Marylebone and 2.15 p.m. *ex*-London Road, both in 4¾ hours. by the Great Central route.

Continuing, however, with the Midland improvements, we have the 8.5 a.m. from Derby to London quickened 13 min., with a 60 min. run from Bedford to St. Pancras (49·9 miles), by the loss of the Sheffield and Nottingham portion; the latter, stopping now only at Manton between Nottingham and London, covers this last stretch of 90¼ miles in 107 min. (50.5 m.p.h.) and is due at 11 a.m., a gain of 30 min. Principal remaining accelerations relate to the newly reinstituted 3.10 p.m. down Leeds express, and the up train at 9.40 a.m. The former starts 10 min. later, makes Kettering (72 miles) in 86 min., and runs thence to Nottingham (51·6 miles) in 61 min.—two consecutive runs at 50·2 and 50·6 m.p.h. respectively; while the up train is booked from Leicester to London in 118 min., at 50.3 m.p.h. Leeds to London *via* Sheffield is therefore done in 4 hours 35 min. on the up journey, and, with the additional diversion *via* Nottingham on the down, in 4 hours 48 min., respective gains of 23 and 24 min. These quickenings are commendable, and show good promise of better things in the future, but there are still many important Midland expresses of exactly similar loading left on woefully slow schedules.

It was not to be expected that all the multitudinous seaside summer expresses on the South Eastern and Chatham Railway would find their way into the winter time-tables, but room has been found for a surprisingly large number of them. In some directions, even, there are further improvements: the 5.5 p.m. Hastings express from Cannon Street, for example, is now divided, and the first portion is scheduled as non-stop to West St. Leonard's, while the 3.40 p.m. down, non-stop to Warrior Square, is still retained. The 4.40 p.m. from Charing Cross to Bexhill now becomes the second portion of the former train, at 5.10 p.m. from Cannon Street, and carries its slow portion for

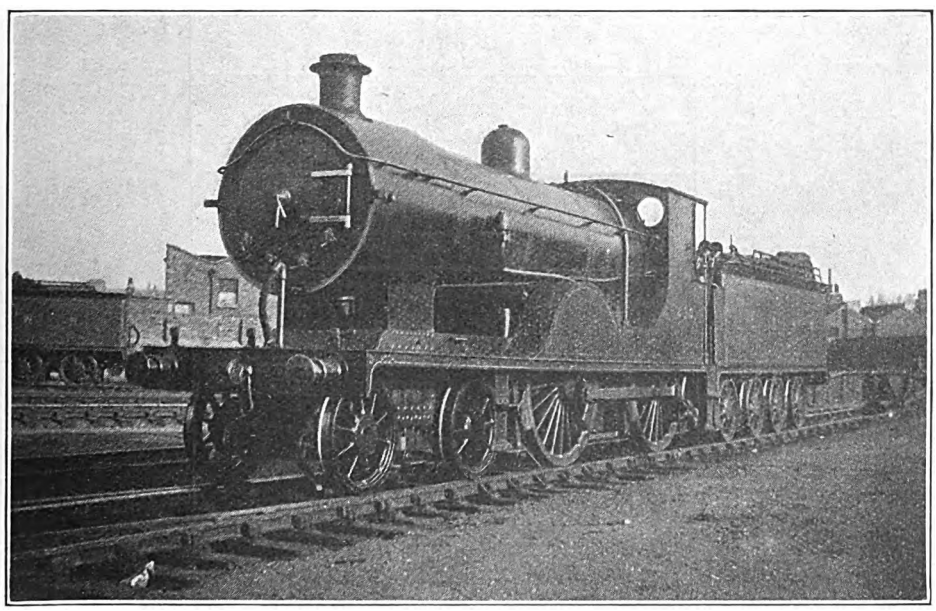

Photo.] LONDON AND SOUTH WESTERN RAILWAY. [*F. H. Stingemore.*

Drummond 4-4-0 engine No. 430, rebuilt with Eastleigh superheater and extended smokebox and with firebox water tubes removed.

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L. & S.W.R. WATERLOO—WINCHESTER.

Distance.		Run No :	1	2	3	4	5	6	7	8	9	10	11
		Engine No. :	472	472	469	682	467	468	472	463*	731	471	739
		Type :	A	A	A	B	A	A	A	A	C	A	D
		Load (axles) :	44	44	44	46	46	46	48	48	52	52	56
		Load (tons, full) :	325	325	325	345	345	345	350	350	375	380	395
Miles.			m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
0·0	Waterloo		0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
3·9	Clapham Junction		8 15	7 20	7 55	8 35 (Sigs.)	7 35	8 10	7 30	7 40	7 40	7 40	7 43
12·1	Surbiton		19 20	17 20	17 45	22 5	18 55	18 55	17 30	18 15	18 45	18 5	18 46
19·2	Weybridge		28 20	25 35	25 10	31 50	27 0	27 0	25 0	26 0	28 30	26 0	27 11
24·4	Woking		35 0	31 40	30 55	39 10	33 20	32 15	30 40	31 45	34 0	31 50	33 51
33·3	Farnborough		48 10	45 0	42 35	54 55	46 15	43 50	42 25	43 30	48 5	43 50	46 29
39·9	Winchfield		55 45	52 40	50 20	64 0	54 50	51 25	50 45	50 30	56 55	51 20	54 36
47·9	Basingstoke		65 45	62 5	60 40	75 20	63 15	61 50	61 25	59 30	68 10	60 30	64 56
50·4	Worting Junction		69 30	65 35	64 55	80 10	66 50	65 35	66 5	63 15	72 40	64 0	68 35
58·2	Micheldever		79 45	77 0	76 20	93 5	78 0 (Sigs.)	77 45	78 25	73 50	84 20	75 0 (Sigs.)	78 52
66·7	Winchester		88 0	86 40	84 45	102 10	91 10	86 10	87 55	84 35	93 0	84 45	87 53

A: Superheated large 4-4-0. B: Adams 4-4-0. C: Small Drummond 4-4-0.

D: Urie 6 ft. 7 in. superheated 4-6-0, "736" series. * Piloted by 4-4-0, No. 118.

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stations between Tunbridge Wells and Hastings. The 8.30 p.m. down Folkestone express merges into the 9.30 p.m. to Hastings, making a smart run over the all but 40 miles between Tonbridge and Shorncliffe in 48 min., *i.e.*, at 50 m.p.h. average. Of the 90-minute Folkestone trains the 4 and 7 p.m. down and the 8.5 and 11 a.m. and 5 p.m. up remain (with the 11 a.m. down in 96 min.), while the 3.15 p.m. from Victoria to Margate and the 8 a.m. from Margate to Cannon Street still complete that journey in the same time, with the 9.10 a.m. down in 92 min. and the 9.2 a.m. up in 94 min. Another improvement is seen in the provision of several useful semi-fast trains in each direction between Redhill and Reading, with connections to and from both Tonbridge and London.

The Great Eastern Railway has also a splendid winter programme. Its most noteworthy features are the continuation daily of the 12.30 p.m. down Cromer express, reaching Colchester in 66 min., and the reappearance of one of the "Radical Alterations" innovations of October, 1914—the 5.30 p.m. down Clacton express, calling first at Thorpe-le-Soken in 88 min. from London. Both these trains were non-existent in the pre-war winter time-tables, as were also the 8.15 a.m. down Cromer breakfast car express and the 10.20 a.m. to Clacton, relieving as far as Colchester the heavy 10 a.m. train. The Continental express also reappears at its time-honoured hour of 8.30 p.m., on four days a week, and reaches Parkeston Quay in 88 min., or only 6 min. over its accelerated time after the introduction of the 4–6–0 superheater engines. Another useful train, whose origin may also be traced to the October, 1914, time-tables, is the 12.21 p.m. from Ipswich to Liverpool Street, now carrying luncheon cars and running up from Colchester in 66 min; while the 5.30 p.m. from Cromer resumes its non-stop journey from Ipswich, and reaches Liverpool Street in the excellent time of 86 min.—the fastest at present operating between these two points. Seven trains daily make this run without intermediate stoppage. On the Cambridge line the 5.13 a.m. down express to Cambridge reappears, and a still more valuable resuscitation is that of the 7.2 p.m. to Norwich, now calling at Bishop's Stortford and Audley End instead of slipping coaches there, and once again conveying restaurant cars. The 5.22 p.m. from Doncaster is put on again, running through to Liverpool Street as previously, and forms one of four Great Eastern expresses now running over the Great Northern and Great Eastern joint line. Thus, alone of all the British railway companies, the Great Eastern and South Eastern and Chatham have now instituted winter train

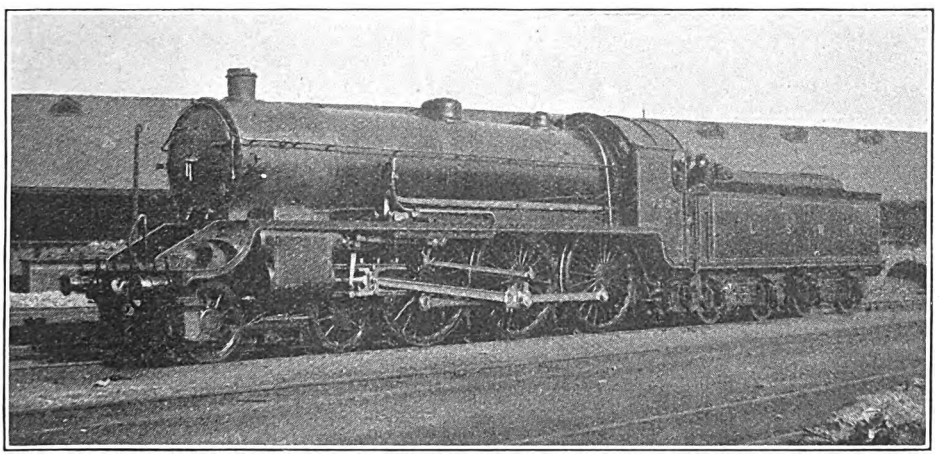

Photo.] LONDON AND SOUTH WESTERN RAILWAY. [*F. H. Stingemore.*

Mr. R. W. Urie's new 2-cylinder 4-6-0 superheater express locomotive No. 738.

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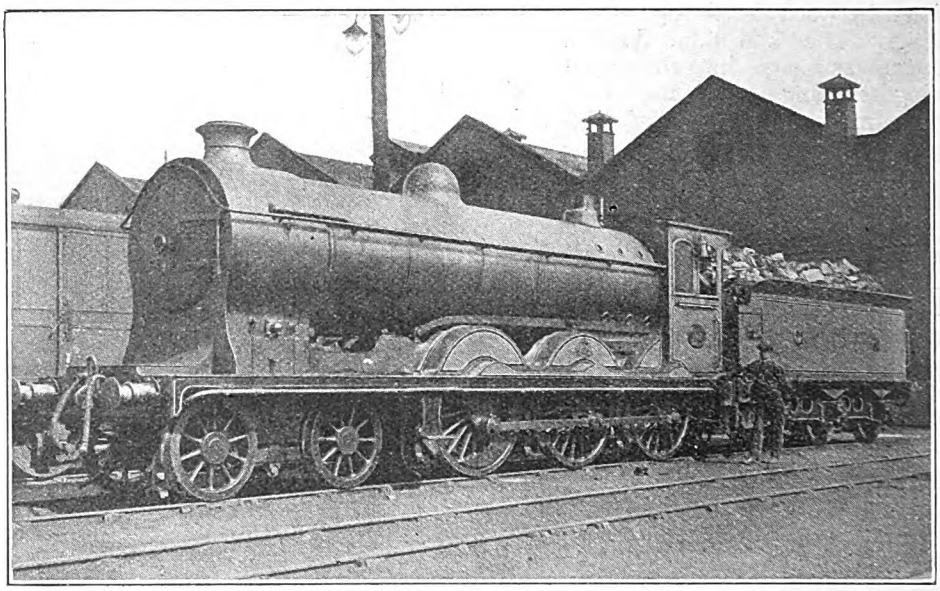

Photo.] CALEDONIAN RAILWAY. [*W. H. Whitworth.*

5 ft. 9 in. 4-6-0 superheater mixed traffic locomotive No. 188.

services actually *superior*, both in point of the number and timing of trains, to those operating before the war. Let us hope that in the near future the "sincerest flattery" of such managerial enterprise will be extended to them by neighbouring companies by the much-needed method of imitation.

Before going on to performance proper I have another correspondent's description of a run which requires comment. It will be remembered that in the last issue I was once again emphasising the absolute necessity of accuracy in recording locomotive performance if the record is to have any subsequent value. The trouble about this particular run is not, so far as I have noticed, any particular inaccuracy in the timing, although this appears somewhat approximate, but the extraordinary superstructure of enthusiasm which my young friend has erected on an entire misconception as to the nature of the route over which he was travelling. But let him unfold his own tale. "I wish to send you," he says, "a very fine piece of locomotive performance on the Glasgow and South Western Railway behind 4-6-0 superheater engine No. 512 (Mr. J. Manson's design—formerly No. 128) and No. 346, a Manson 4-4-0, as pilot. My run was from Kilmarnock to Carlisle, and the train fully loaded was 383 tons, as nearly as I could estimate. The 4-6-0, with cylinders 21 in. by 26 in., and only 150 lb. working pressure and 6 ft. 6 in. driving wheels, could develop 20,000 lb. tractive effort at 90 per cent. working pressure." A useful piece of information, for which I am grateful.

"Out of Kilmarnock the two engines did simply magnificently. From Kilmarnock, Hurlford, 1¾ miles, was passed in 3 min. 40 sec.; Mauchline, 9½ miles, in 16 min. 30 sec.; Auchinleck, 14 miles, in 22 min. 7 sec.; Old Cumnock, 16 miles, in 25 min. 30 sec.; and New Cumnock, 21¼ miles, in 32 min. 15 sec. All up this hill is at an average of 1 in 99, and to average 40 m.p.h. with nearly 400 tons behind the tender is something of outstanding merit." Unquestionably, but my only difficulty is that the line appears to have become somewhat steeper than when I last travelled over it. My gradient profile, in point of fact, shows, not 21¼ miles averaging 1 in 99, but 1¼ miles at that inclination, and nothing else so steep. From Kilmarnock there is a fall at 1 in 200 for ½-mile, and a gentle rise thence to Hurlford, steepening to 1 in 210 for ¾-mile after that station. Then comes the worst ascent—4 miles, not 21¼—

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at 1 in 99—100 to Mossgiel Tunnel, followed by another mile of ascent easing from 1 in 105 to 1 in 380. From there ensue 2½ miles of *falling* grades to the viaduct beyond Mauchline. Then come four more ascending miles at 1 in 150-180 to beyond Auchinleck, 1½ level miles to Old Cumnock, 3 rising miles at 1 in 145-175, and finally 1½ gradually falling miles to New Cumnock. New Cumnock is thus approximately 450 ft. above Kilmarnock instead of some 1,130 ft., as my correspondent would make it; while the average ascent works out, not at 1 in 99, but at 1 in 250! Now where on earth could he have obtained such information? And here, again, the point arises as to the preliminary scrutiny of runs before they are sent to me. If the grade were to average 1 in 99 continuously, why should the 7¾ miles from Hurlford to Mauchline occupy 12 min. 50 sec., at an average of 36.2 m.p.h., and the ensuing 4½ miles to Auchinleck 5 min. 37 sec., at an average of nearly 49?

After Old Cumnock the train streaked along at so terrific a pace that my young friend appears to have been unable to get to nearer times than quarter-minutes as the stations flashed by. "Kirkconnel, 28¾ miles, was passed in 41½ min., and Sanquhar, 32 miles in 45 min. exactly; Carronbridge, 40¾ miles, in 54 min.; Thornhill, 44 miles, in 57½ min.; Closeburn, 46¾ miles, in 60½ min. Then came a very brisk performance, as the 8 miles from Closeburn to Holywood were run in the very smart time of 6½ min., an average of 73.8 m.p.h., and a maximum of 74.2 m.p.h. Before this we had attained 72.7 m.p.h. near Carronbridge. Auldgirth, 50½ miles, in 65 min.; Holywood, 54¾ miles, in 68 min."—my enthusiastic co-timist appears here to have missed the crowning feature of the run, 4¼ miles in 3 min. = 85 m.p.h. average; but I suspect that the Auldgirth time *might* be 64 min.—" and Dumfries was reached in the surprising time of 72 min. for the 58¼ miles from Kilmarnock, a gain of 10 min. on schedule, and an average of 48½ m.p.h. throughout, inclusive of 20 miles up at 1 in 99, *i.e.*, average." A trifle of 1¼ miles here gets lopped off that terrible ascent from Kilmarnock, but it still appears to fill the writer's mind to the exclusion of all else. "From New Cumnock to Dumfries stop, 37 miles, were run in 40½ min., at an

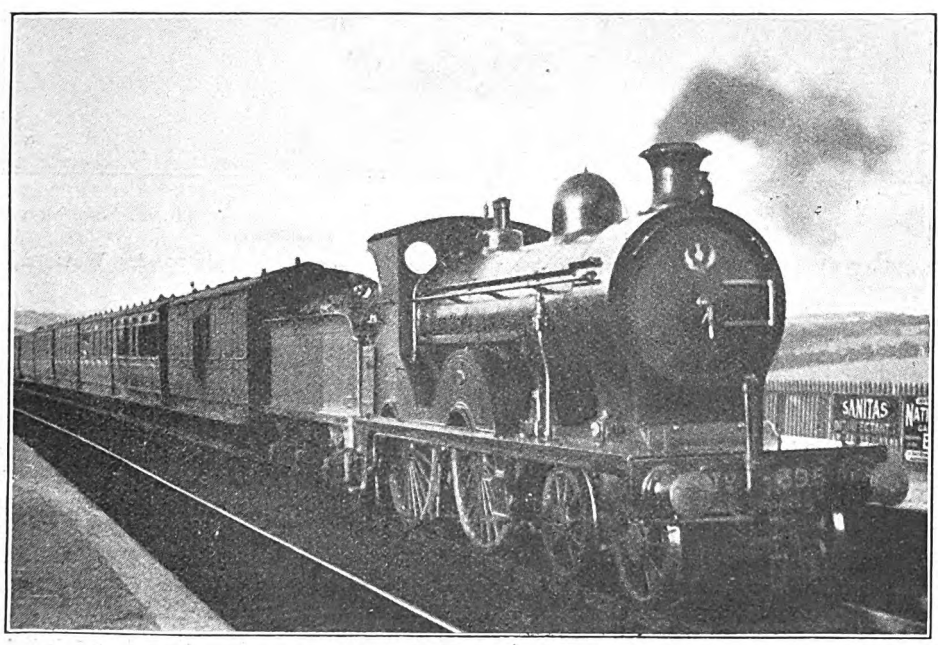

Photo.] [*E. A. Gurney-Smith.*

GLASGOW AND SOUTH WESTERN RAILWAY.
Darvel-Kilmarnock train at Galston, 4-4-0 engine No. 395.

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average of 55¼ m.p.h. This was only 3 min. behind the pre-war booking of 69 min.,"—it was 68 min., to be precise—" and with nearly a 400-ton load!"

Passing over the continuation of the run to Carlisle I come to my correspondent's conclusions, and they are indeed weighty. "The 37 miles, which were covered in 40½ min., 55¼ m.p.h., from New Cumnock to Dumfries, was really magnificent." I am not quite clear here whether it is the scenery, the track, or the speed that is thus eulogised, presumably the latter—"as 20 miles of it were down-hill, and 17 up and down, or undulating." Curiously enough, that profile of mine once again appears to join issue with my young instructor. In the 37 miles mentioned it shows 7½ level miles, two short stretches of adverse gradient—one a mile long and the other 2½ miles long, between Sanquhar and Carronbridge—and the whole of the remainder, 26 miles in all, downhill. "We never fell below 30 m.p.h. all the way up the ascent from Kilmarnock to New Cumnock. This really was the most magnificent performance I have ever yet heard of, although I am a frequent reader of the RAILWAY MAGAZINE. This 4-6-0 engine, No. 512, with only 150 lb. pressure, has done the fastest uphill work of any engine I have ever heard of"—what was the pilot No. 346, doing on the ascent, by the way?—"and I have heard some one say it is the finest engine in Great Britain, and I must say I think so too."

It is refreshing to hear of such settled convictions in a matter which some of us have foolishly and unsuccessfully been attempting to decide for many years past. But the judgment which our young friend—*very* young, I fear—has expressed with so enviable a wealth of superlatives on this run has the same slender basis as the record run on the London and North Western Railway which enlivened these columns last month. It was a good run, but it falls far short of many pre-war experiences. And as to hill-climbing, I seem to have a hazy recollection—being a frequent reader of the RAILWAY MAGAZINE, and especially of "British Locomotive Practice and Performance"—of *Sir Gilbert Claughton* on the London and North Western Railway attaining 48½ m.p.h. on Grayrigg bank, from starting at Oxenholme, and maintaining 46½ on a 1 in 106 grade, unpiloted, with a 310-ton train

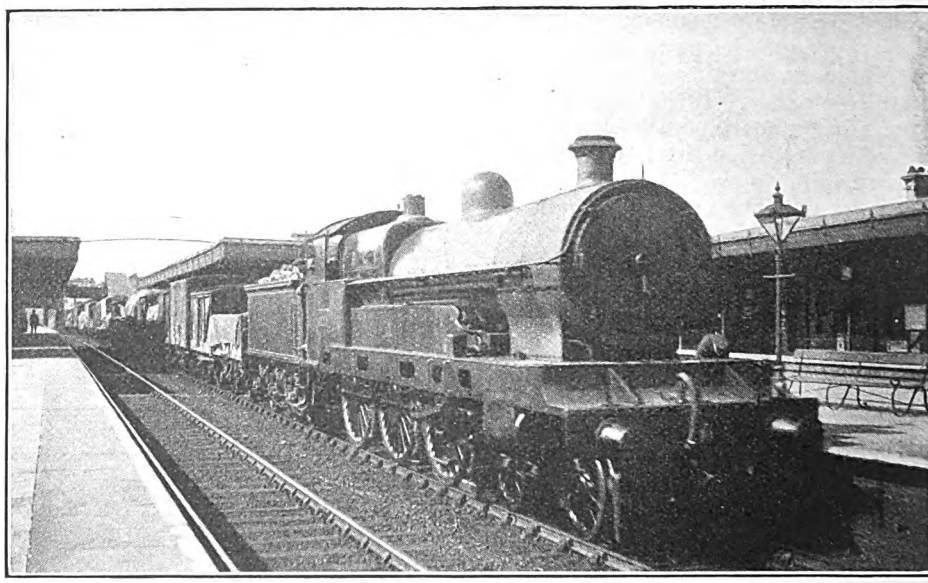

Photo.] [*F. H. Stingemore.*

LONDON AND NORTH WESTERN RAILWAY.

4-6-0 "Claughton" Class engine No. 1334 (unnamed) on up goods train passing Watford Junction.

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load. This seems to me superior to 30 m.p.h. on 1 in 99-100 with 383 tons, piloted! *Experientia docet.*

And now for an authoritative run on the Glasgow and South Western Railway, timed by a friend who is expert at his work. It was made immediately prior to the worst war decelerations, on the 11 a.m. southbound express, by engines Nos. 125, 4–6–0 and 252, large-boilered 4–4–0 (original numbering), with a 41-axle train weighing only 280 tons full. On the slightly rising stretch out of Glasgow the two engines attained 51 m.p.h., passing Barrhead, 7·6 miles, in 11 min. 20 sec., but the 3 miles at 1 in 67-70 of Neilston bank (with its additional commencing mile and concluding ¼-mile at 1 in 100) brought speed down to 30 m.p.h., and occasioned a time of 8 min. 27 sec. for the 5·2 miles from Barrhead to Caldwell. On the slight descent to the latter station a speed of 56 m.p.h. was reached, and the 3·9 level miles on to Dunlop, including a slight p.w.r. check, occupied 4 min. 50 sec. On the sharp descent to Kilmarnock no higher speed was reached than 72 m.p.h., the 7·7 miles in from Dunlop, including slight signal delays, occupying exactly 8¾ min. This gave a total of 33 min. 22 sec., or 32¾ min. net for the 24·4 miles from Glasgow, against a schedule for this mountainous length of 35 min. Leaving Kilmarnock, on the easy stretch to Hurlford the two engines worked up to 46 m.p.h., and then maintained 35 on the 4 miles at 1 in 99–100. A slight slack was effected at Mauchline, but speed at the viaduct reached 56 m.p.h.; the 1 in 150-180 stretch to Auchinleck was then taken at a minimum of 47 m.p.h., and the final 1 in 145–175 length before New Cumnock at the same lowest rate—this was good hill-climbing work—the intervening short and easy stretch to Old Cumnock producing a maximum of 55 m.p.h. So Hurlford, 1·7 miles, was passed in 3 min. 11 sec.; Mauchline, 9·4 miles, in 14 min. 46 sec.; Auchinleck, 13·8 miles, in 19 min. 54 sec.; and New Cumnock, 21·1 miles, in 28 min. 37 sec. After this the engines were eased, the 10·8 easy miles on to Sanquhar being run in 11 min.; the 8·6 miles thence to Carronbridge in 8 min. 20 sec., with a maximum of 71 m.p.h., and a minimum of 52 on the two short ascents; and the final 17·5 miles into Dumfries, with slight signal and p.w.r. checks and very easy running, in 18 min. 47 sec. Gross time from Kilmarnock to Dumfries, 58 miles,

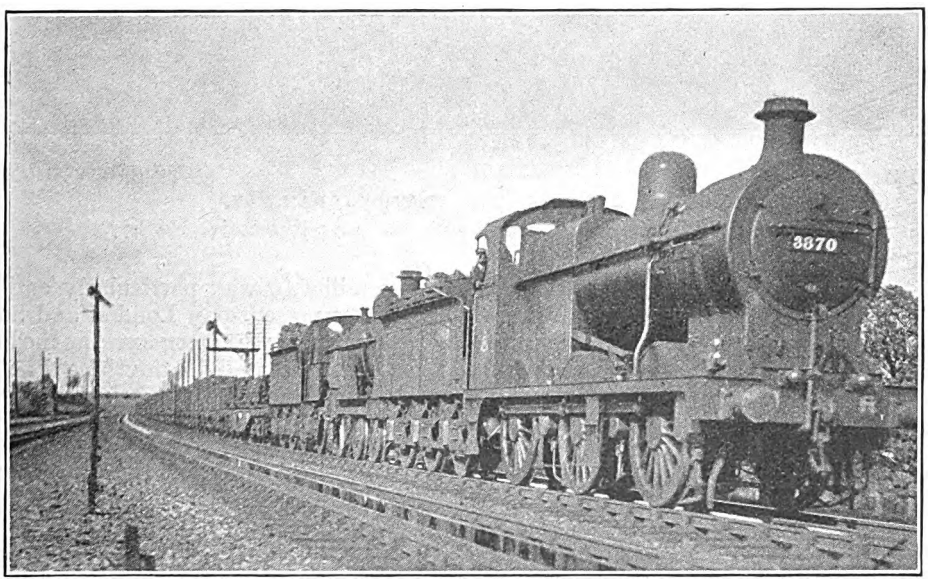

Photo.] MIDLAND RAILWAY. [*F. W. Goslin.*

Up goods train passing Oakley water troughs. Class 4 0-6-0 superheater locomotive No. 3870 piloting, and Class 1 4-2-2 as train engine.

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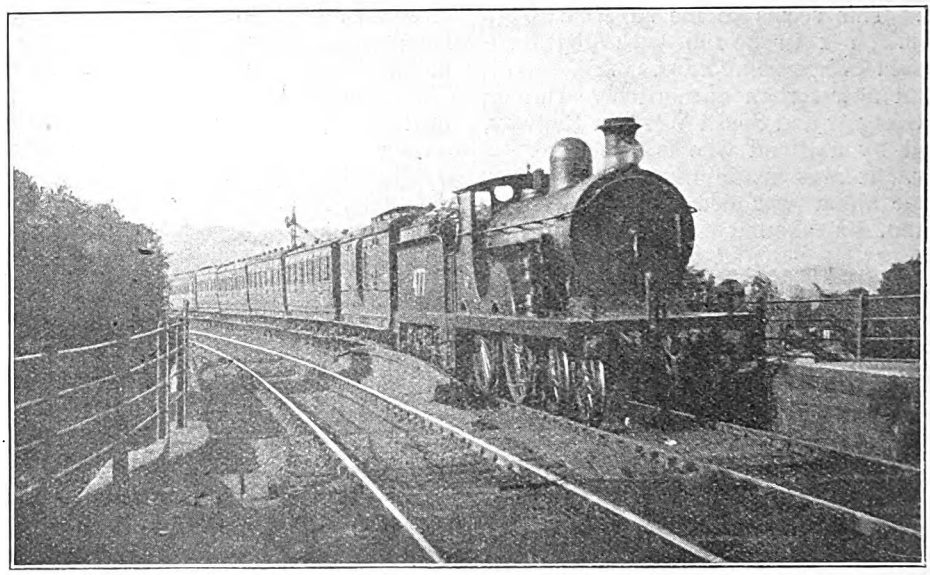

Photo.] [*E. A. Gurney-Smith.*

SOUTH EASTERN AND CHATHAM RAILWAY.

Victoria-Maidstone express near Eynsford. 4-4-0 locomotive No. 477.

was thus 66 min. 44 sec., but net time did not exceed 65 min., and was probably less. More smart running ensued from Dumfries to Carlisle, Ruthwell, 8·5 miles (including 2¼ miles ascent at 1 in 150) being passed in 10 min. 51 sec.; Annan, 15·5 miles, in 17 min. 13 sec.; Gretna Green, 23·6 miles, in 25 min. 22 sec.; and Gretna, 24·4 miles, in 26 min. 42 sec., at a reduced speed of 35 m.p.h. Signal delays were experienced before Carlisle, the 33·1 miles from Dumfries taking in all 38 min. 52 sec., but the net time of 37 min. showed an improvement of 3 min. on schedule. So on these pre-war bookings the two engines had economised (allowing for delays) 2¼, 3 and 3 min., or a total of 8¼ min., by this very brisk exhibition, but of course the load was very moderate.

From the Glasgow and South Western Railway to the London and South Western is a long way in point of distance, but the conjunction of names suggests to me how I may the most suitably employ the remainder of my space—by describing the promised collection of runs over the latter line. For reasons given in the last issue they consist entirely of journeys timed by correspondents, who have been kind enough to furnish me with the results of their labours. With every effort to do so, it is not possible to wax particularly enthusiastic over present-day London and South Western Railway performance, as the loads have not increased in anything like the same proportion as the schedule times. There is a close correspondence in this respect between the London and South Western and Midland Railways. Both lines delayed their decelerations till the latest possible period in the war, but when the slowings finally did take effect they were drastic in the extreme. The Midland services now appear to be well on the road to recovery, but no advance whatever in actual speed has been made since the war by the London and South Western Railway, although many extra trains have been put on, and a reduced number of stops, of course, entails faster overall times in some cases. It is well, however, that for the sake of record we should devote a little time to current London and South Western Railway performance, more especially as the work of a new locomotive class—the new large Urie 6 ft. 7 in. 4–6–0's—requires to be described.

First of all comes a series of 11 runs on down expresses running non-stop to Winchester, which, for the sake of brevity, I have tabulated; the bulk of them are behind the large-boilered Drummond

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4–4–0 engines of the 463-472 series, which since superheating appear to work the majority of the express trains on this route. No. 1 was a feeble exhibition, speed falling to 36½ m.p.h. at mile-post 31 (after 10½ continuously uphill miles, steepening from 1 in 388 to 1 in 298); but after Winchfield things brightened somewhat, and the minimum of 38 m.p.h. on Worting bank (5¾ miles at 1 in 249), and the maximum of 61½ on Micheldever bank, were above the average. Time was just kept. The same engine started a good deal more briskly to Woking on the second run, but again fell to 36½ m.p.h. at mile-post 31, and left the advantage with the previous trip as far as Winchfield. Smarter running followed from there to Litchfield, but the minimum beyond Worting was 36 m.p.h.; and the subsequent running was much slower. However, over 1¼ min. were gained to Winchester. No. 469 (Run 3), though not hurrying to Clapham Junction, ran quite brilliantly thence to Woking, touching 60 m.p.h. at Hampton Court Junction; minimum rate at mile-post 31 was 38 m.p.h., but with time well in hand the driver allowed the speed to drop to 32½ at Battledown Junction. By a spell at 69½ m.p.h. on the succeeding descent, however, Winchester was reached in 84¾ min., 3¼ min. before time.

The Adams 4–4–0 in Run No. 4, put on in place of a larger engine which had failed, made rather an unfortunate exhibition, although matters were complicated by a drizzle and a bad signal check just beyond Earlsfield, costing probably 4 min.. Speed reached 53 m.p.h. at Esher, but fell to 30 at mile-post 31; recovering only to 45½ at Hook, it dropped to 29½ at Battledown, and, but for a maximum of 66 m.p.h. on Micheldever bank, the loss would have been greater. Net time to Winchester was 98 min.—10 min. over schedule—but obviously the engine was badly overloaded. No. 5 was a very fair run, especially in its uphill stages, although the weather conditions were bad, with rain and a strong south-west wind. The minima of 42 m.p.h. at mile-post 31 and 40 at Battledown were quite good, and the 60 m.p.h. limit was rigidly observed, speed not rising above 57 at Micheldever. Net time, allowing for the concluding delay, was about 87 min. No. 468 (Run

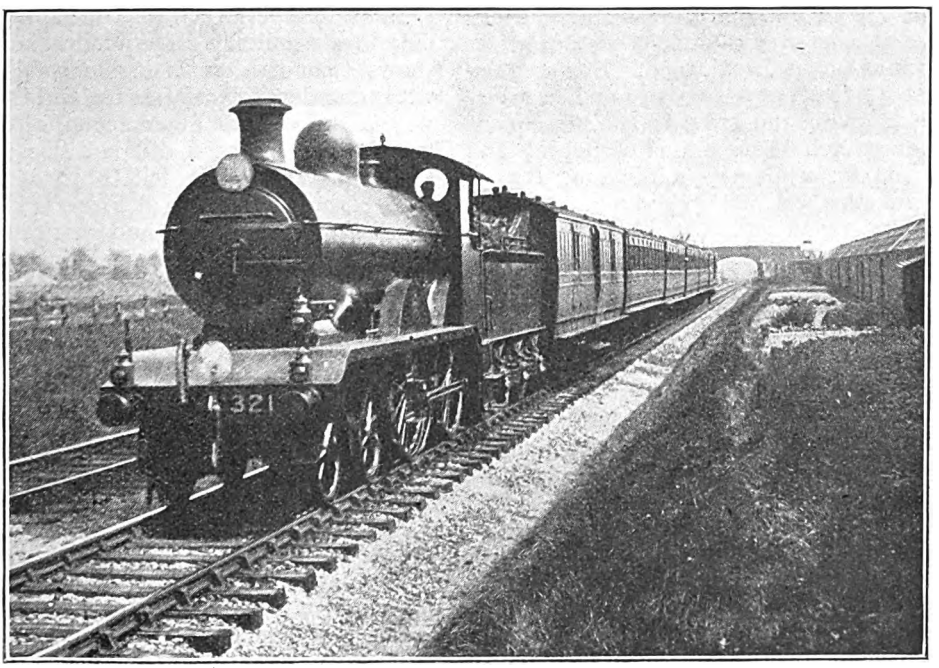

Photo.] [*E. A. Gurney-Smith.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

Brighton-Portsmouth fast train near Worthing. Rebuilt 4-4-0 engine No. 321.

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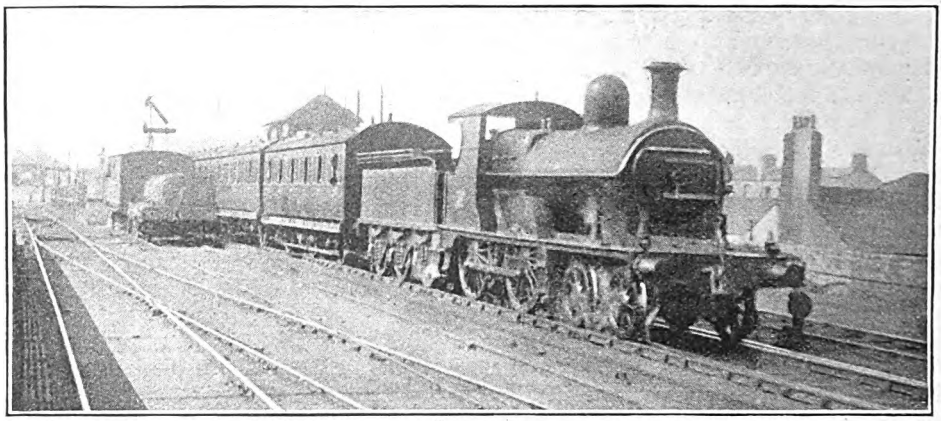

Photo.] [*K. A. C. R. Nunn.*

DUBLIN AND SOUTH EASTERN RAILWAY

Dublin-Waterford express at Bray. 4-4-0 locomotive No. 56 "Rathmines."

6) started poorly, but after Surbiton developed some good speed, touching 60 m.p.h. at Brooklands, and only falling to 42 at mile-post 31; after that, the work fell off, and the minimum rate at Battledown was 32½ m.p.h. A brisk sprint down to Winchester, however, with a top speed of 69½ m.p.h., resulted in an arrival nearly 2 min. early. The next two runs are in curious contrast, as the unpiloted engine did distinctly the better work as far as Brookwood. But at mile-post 31 No. 472 fell to 39 m.p.h. against the 42 of 463 and 118; on the subsequent level stretch the maxima were 52½ and 58 m.p.h., while the minima at Battledown were 32½ and 37½ m.p.h. No. 472 fell subsequently to 31 m.p.h. at Litchfield, and only accelerated to 57 on the concluding descent; but the drivers of the piloted train were so excessively cautious that continuous applications of the brakes kept the speed down to the alarming maximum of 50½ m.p.h. The net result was that No. 472 just kept time, and Nos. 463 and 118 gained 3½ min. In Run No. 9 the small engine was again overloaded—and reasonably so, with a crowded train of 13 8-wheelers—the only good feature of the journey being the start. In consideration of the power of the locomotive concerned, this was excellent, and illustrated the advantage held by a non-superheater over a superheater engine in the earliest stages of a run, when both are starting "cold." Speed details are lacking from this journey. Run No. 10 reached me from a young Southampton correspondent (the foregoing trips having been timed by a naval friend), and "features" one of the superheater 4-4-0's really heavily loaded. In all the circumstances this is about the best run of the whole series, especially as the concluding delay made the net time from Waterloo about 83¼ min., *i.e.* 4¾ min. under schedule.

No. 739's performance, timed in great detail by a military correspondent, clearly shows that the great engine was being worked under very easy steam, and the run was a humdrum affair, even allowing for the load. Speed did not rise above 52½ m.p.h. at Esher, fell to 39 at mile-post 31, only rose to 50 at Fleet, fell again to 39 at Battledown, and was allowed finally to reach 66½ m.p.h. before the train stopped at Winchester. Time was kept exactly. As showing the sluggishness of this 88-min. schedule, and as illustrating the variation in the work of the various drivers at different stages of the journey, it is instructive to note that an analysis of the best times on these runs gives the following aggregate results: to Surbiton, 17 min. 10 sec.; Woking, 29 min. 50 sec.; Farnborough, 41 min. 25 sec.; Winchfield, 48 min. 25 sec.; Basingstoke, 56 min. 25 sec.; Worting, 59 min. 55 sec.; Micheldever, 70 min. 10 sec.; and Winchester, 78 min. 25 sec.—equal to an average of just 51 m.p.h., and, in consideration of average load, superior to average pre-war performance. No. 471 covered the 12·6 miles from Winchester

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to Southampton West in 17 min. 50 sec., slacking round Northam curve, and also slightly through Eastleigh, which was passed in 9 min. 50 sec. (6·9 miles); No. 739 passed the latter station in 9 min. 32 sec., and reached Southampton in 17½ min., not exceeding 60 m.p.h. at any point.

Two non-stop runs between Waterloo and Southampton, although in no way noteworthy, are interesting as affording a direct comparison between the work of the superheated "463" 4–4–0 and No. 422 of the penultimate Drummond 4–4–0 series, also now superheated. Loads were 48 and 51 axles respectively, or 345 and 370 tons with passengers and luggage. To Clapham Junction the times were 8 min. 4 and 20 sec.; to Surbiton, 18 min. 51 and 35 sec.; to Weybridge, 26 min. 44 and 50 sec.; to Woking, 32 min. 38 and 33 min. 10 sec.; to Farnborough, 45 min. 4 sec. and 46 min. 10 sec.; to Basingstoke, 62 min. 21 sec. and 64½ min.; to Micheldever, 78 min. 8 sec. and 79 min. 50 sec.; to Winchester, 87 min. 11 sec. and 89 min. 50 sec.; to Eastleigh, 73·6 miles, 94 min. 23 sec. and 95 min. 55 sec.; and to Southampton, 79·3 miles, 102 min. 9 sec. and 103 min. 10 sec. As will be seen, practically no advantage was taken of the falling grades from Litchfield onwards.

Beyond Southampton I have details of three runs, on two of which the engines employed were of the new large-boilered 4–6–0 class. One was a continuation of No. 739's journey with 395 tons; the second continued No. 467's run just described, with 345 tons; the third was a trip behind No. 741, another 4–6–0, with a more moderate load of 245 tons, on a very wet and windy day. The two first-mentioned trains called at Brockenhurst, and completed the journey of 13·5 miles from Southampton in 19 min. 56 sec. and 20 min. exactly, passing Redbridge, 2·6 miles, in 5 min. 42 sec. and 6 min. 19 sec., and Lyndhurst Road, 6·1 miles, in 10 min. 22 and 57 sec. After that the 4–4–0, which naturally made the slower start, did some faster downhill running, touching 58 m.p.h. as against 739's 55½, and so practically tied with the bigger engine in the time to Brockenhurst. From Brockenhurst the rising start to Sway, 2·8 miles, was compassed in 6 min. 37 sec. and 7 min. 23 sec., and Hinton Admiral, 8·3 miles, was passed in 13 min. 1 sec. and 14 min. 9 sec. Christchurch, 11·5 miles, was reached by No. 739 in 16 min. 50 sec., but passed by No. 467 in 17 min. 17 sec., the first stop in the latter case being Boscombe, 14 miles, in 21 min. 3 sec. In the latter case a speed of 62 m.p.h. was attained before Christchurch, where the brakes were applied. No. 741, with the lighter train, got through Redbridge in 5¼ min., Lyndhurst Road in 10 min.

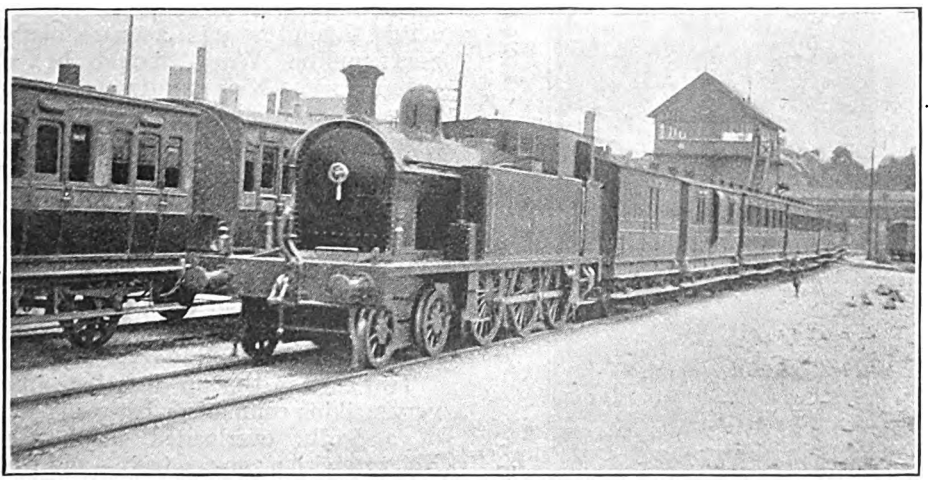

Photo.] [*K. A. C. R. Nunn.*

CORK, BANDON AND SOUTH COAST RAILWAY.

Baltimore-Cork train entering Cork station. 4-6-0 tank engine No. 19.

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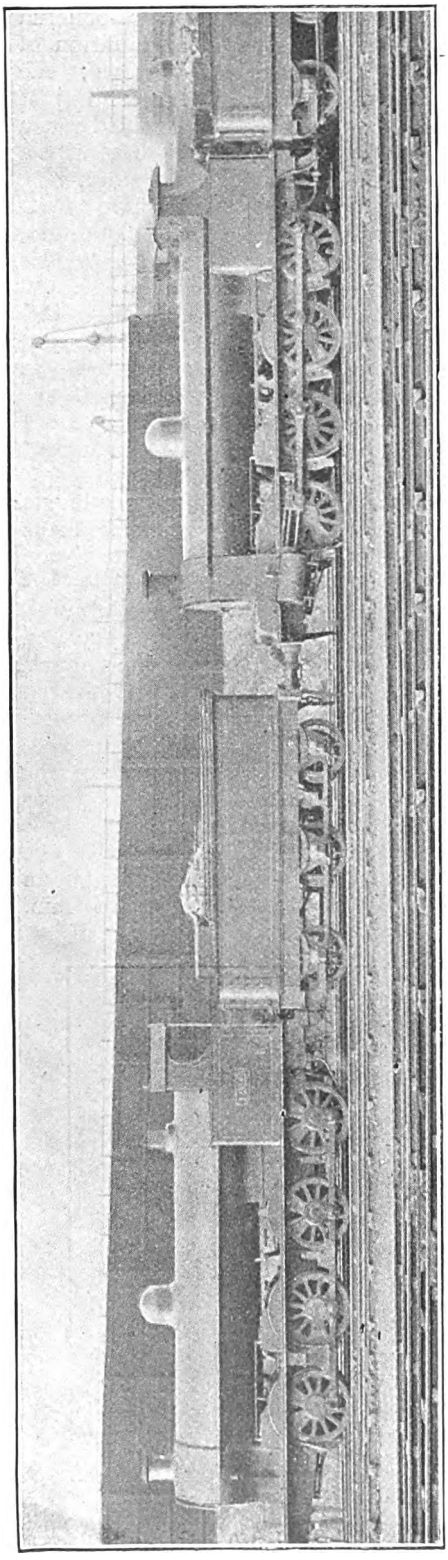

[*P. F. Cooke.*

LONDON & NORTH WESTERN RAILWAY.

Simple 0-8-0 No. 1229 and Webb Compound 4-Cylinder 0-8-0 No. 826, at Liverpool.

Photo.]

25 sec., and Brockenhurst in 18¾ min.; but was brought to a dead stand at Lymington Junction by adverse signals. The rising grades here afford a difficult start, but only 2 min. were lost on the 41 min. schedule from Southampton to Bournemouth, 28·7 miles. Net time was 39 min. My correspondent notes that the engine slipped badly at each start.

A much more interesting down journey was that made by a relief Bournemouth non-stop express shortly prior to the introduction of the new time-tables. No. 460, one of the re-built and superheated 4-cylinder 4–6–0's, was the engine, and 51 axles of non-corridor stock, weighing full 310 tons, the load. Clapham Junction was passed in 7 min. 55 sec., and Surbiton in 18 min. 41 sec.; then came a signal check to walking pace at Hampton Court Junction, so that the time to Weybridge was 29 min. 39 sec., and to Woking, 36 min. 3 sec. After that good work was performed, Farnborough being passed in 47 min. 16 sec.; Winchfield in 54 min. 13 sec.; Basingstoke in 62¾ min.; Worting in 65 min. 31 sec.; Litchfield Box—56·2 miles, and a very important timing point, missed by all my other correspondents, as it practically marks the summit level of the line between Waterloo and Southampton—in 71 min. 16 sec.; Winchester in 83 min. 8 sec. (79½ min. net), and Eastleigh in 89½ min. Then came another prolonged crawl to near St. Denys, again costing fully 3½ min., so that the actual time of 99 min. 25 sec., to passing Southampton West, should be about 92½ min. net. Nine minutes were occupied between Southampton and Lyndhurst Road, and 8 min. 44 sec. thence to Brockenhurst; Brockenhurst to Sway took 3 min. 34 sec.; Sway to Hinton Admiral, 5 min. 40 sec.; from there to Christchurch, 2 min. 55 sec.; and thence into Bournemouth, 5 min. 56 sec.—total, 135 min. 14 sec. for the 108 miles from Waterloo, or 128¼ min. net. This was an excellent trip.

Two runs in the up direction afford a very striking comparison between the work of a badly overloaded small 4–4–0—No. 773, with a 350-ton train—and No. 472 of the "463" 4–4–0 series, also with a handsome trainload of 370 tons to Southampton and 390 tons thence to London. Both have reached me, as also

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the last run described, from an old friend at Ealing, and are recorded in great detail. No. 773 ran to Christchurch, 3·7 miles, in 7 min. 36 sec.; starting from there on 4 miles ascent steepening to 1 in 103 passed Hinton, 3·2 miles, in 7 min. 44 sec., and Sway, 8·7 miles, in 16 min. 17 sec., reaching Brockenhurst, 11·5 miles, in 20 min. 19 sec. No. 472 passed Christchurch in 7 min. 4 sec., Hinton in 10 min. 43 sec., and Sway in 18 min. 9 sec., reaching Brockenhurst, 15·2 miles, in one second under 24 min. No. 773 had lost approximately 2 min. on this initial stage. From Brockenhurst the times to Lyndhurst Road, 7·4 miles, were 11 min. 40 and 13 sec.; to Redbridge, 10·9 miles, 15 min. 37 sec. and 14 min. 43 sec., and to Southampton West, 13·5 miles, 20 min. 28 sec. and 18 min. 40 sec.—a loss of 1½ min. in the former case and a gain of 20 sec. in the latter. Southampton to passing Eastleigh, 5·5 miles, occupied 11 min. 7 sec. and 10 min. 35 sec.; and to stopping at Winchester, 12·6 miles, 22 min. 40 sec. and 21 min. 8 sec. To this point No. 773 had dropped 2½ min., while No. 472 was keeping exact time. Then came the tug-of-war. From Winchester there is a practically continuous ascent, averaging 1 in 250, for 11 miles to mile-post 56¼ (Litchfield), making a terrible start for up trains. No. 773 worked up on this ascent to 35½ m.p.h., whereas in No. 472's case the maximum was only 34½—a remarkable tribute to the efficiency with which the former was being driven. The times to Litchfield, 10·5 miles, were 20 min. 40 and 34 sec. respectively; to Worting, 16·3 miles, 28 min. 51 sec. and 27 min. 48 sec.; and to Basingstoke, 18·9 miles, 31 min. 8 sec. and 30 min. 55 sec., No. 472 having been slackened to 20 m.p.h. to cross over from slow to fast lines at the East Box. Basingstoke to Farnborough, 14·6 miles, took 14 min. 36 sec. and 15 min. 17 sec., with maxima of 65 and 63½ m.p.h.; Farnborough to Woking, 8·9 miles, 9 min. 7 sec. and 8 min. 26 sec., with minima of 53 and 56 m.p.h.; Woking to Surbiton, 12·3 miles, 11 min. 57 and 52 sec., with maxima of 67½ and 68 m.p.h.; Surbiton to Clapham Junction, 8·2 miles, 8 min. 54 sec., and 9 min. 45 sec.; and Clapham Junction to Vauxhall, 2·5 miles, 5 min. 17 sec. and 3 min. 45 sec. No. 773 was badly slacked by signals at Queen's Park and No. 472 at Raynes Park; total times from Winchester to Vauxhall, 65·3 miles, were 80 min. 59 sec. and 80 min. exactly, and net times 79¼ and 77 min. These were, in both cases, very satisfactory times, taking into consideration the limited power of the locomotive in the former case and the 57-axle train in the latter.

But for load the run recorded by another correspondent on one of the days of the brief August Bank Holiday strike on the London and South Western Railway would want some beating. Owing to two previous trains having been cancelled, that by which he travelled had been made up to no less than 17 8-wheelers, all non-corridor stock, but packed to repletion. This being so the 380-ton tare-load of this 68-axle train was probably over 450 tons in gross load, but this was tackled by No. 472, which has figured in so many of the preceding runs, in magnificent style. The particular run was only from Basingstoke to Vauxhall, but Winchfield, 8 miles, was passed in 10¾ min.; Farnborough, 14·6 miles, in 17 min. 35 sec.; Brookwood, 19·8 miles, in 23 min. 5 sec.; Woking, 23·5 miles, in 26 min. 25 sec.; Weybridge, 28·7 miles, in 31 min. 10 sec.; Surbiton, 35·8 miles, in 39 min. 10 sec.; Wimbledon, 40·6 miles, in 45¼ min.; Clapham Junction, 44 miles, in 49 min.; and Vauxhall, 46·5 miles, was reached in 52 min. 25 sec.—only 3½ min. over the pre-war "crack" time, and a sterling achievement. The 22¼ miles from Fleet to Esher were run in 21¾ min. One or two further runs on the West of England section must be held over for some future time, as I have already overstepped the limits of my space.

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Staff Changes on the Underground.

CONSEQUENT upon the death of Mr. W. E. Blake, the well-known Superintendent of the Line for the Metropolitan District and Associated Railways, several important changes and new appointments have been made.

Mr. J. P. Thomas, hitherto General Superintendent of the London General Omnibus Company, Limited, is appointed to the new position of Assistant Operating Manager for the allied undertakings, his former position being taken by Capt. A. Rozier. The office rendered vacant by the death of Mr. Blake has been filled by the appointment of Mr. J. Thornton, hitherto Chief Inspector on the Metropolitan District Railway.

Photo.] [*Hugh Cecil.*

Mr. J. P. THOMAS,
Assistant Operating Manager,
London Underground Railway Group.

Photo.] [*Hugh Cecil.*

CAPTAIN A. ROZIER,
General Superintendent,
London General Omnibus Company, Limited.

We have pleasure in reproducing portraits of these three gentlemen, and the following brief particulars of their careers and experience will be of interest.

Mr. J. P. Thomas, Assistant Operating Manager of the London Underground group of railways and transport undertakings, has held the appointment of General Superintendent of the London General Omnibus Company, Limited, since January, 1915. He is an electrical engineer by training, and was educated at the Durham College of Science, afterwards serving an apprenticeship with Clarke, Chapman and Co., Limited, of Gateshead-on-Tyne. He was then appointed Resident Engineer for the British Thomson-Houston Company, Limited, on their London United & Croydon Tramway contracts, later becoming Resident Engineer on the Central London Railway in regard to the conversion of trains from electric locomotive to multiple-unit haulage, while, in connection with the supply and equipment of rolling-stock on the Great Northern and City (now Metropolitan) Railway, his services were transferred from the contractors to the railway. In 1905 Mr. Thomas was appointed Superintendent of the Line on the London

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Electric Railway, and in due course was given similar oversight on the Central London and City and South London Tubes, holding that office until appointed General Superintendent of the London General Omnibus Company, Limited, as above noted.

Photo.] [*Hugh Cecil.*

MR. J. THORNTON,
Superintendent of the Line, Metropolitan District and Associated Railways.

Capt. A. Rozier, General Superintendent of the London General Omnibus Company, Limited, held appointments with W. T. Goolden and with Easton, Anderson and Co., of Erith, for whom he was responsible for building and erecting lifts installed on the City and South London and Great Northern and City (Metropolitan) Railways. Prior to the opening of the Baker Street and Waterloo Railway, he joined the staff of the Underground Railways as Rolling-Stock and Lifts Engineer. When the Great Northern, Piccadilly and Brompton and Charing Cross, Euston and Hampstead Railways were acquired by the Underground, and were combined with the "Bakerloo" to form the London Electric Railway, he was appointed Mechanical Engineer, also for a period at that time acting as Mechanical Engineer for the London United Tramways. In 1913 Capt. Rozier was transferred to the London General Omnibus Company, Limited, as Assistant Chief Engineer, later taking over the organisation of the training school. Here Capt. Rozier was responsible during the war for the training of thousands of A.S.C. drivers for war service. While holding this position, the title of Superintendent of Training and Catering was conferred upon him.

Mr. J. Thornton, Superintendent of the Line for the Metropolitan District and Associated Railways, has for the past 14 years held the position of Chief Inspector of the Metropolitan District Railway. He has had wide experience, starting as a youth in the Goods Department of the Caledonian Railway, under Superintendent Harvey, at Lothian Road, Edinburgh, afterwards serving in various grades with the North British Railway and the Glasgow District Subway. Later, he came to London and obtained experience on the Central London and Great Northern and City Railways before he eventually joined the staff of the Underground.

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The Barnstaple and Ilfracombe Railway. [No. 1.]

By FRANK E. BOX.

THE earliest proposal for a railway to serve Ilfracombe seems to have been mooted in the early 'forties. An undated map of this period, illustrating the route of a projected London, Salisbury and Exeter railway, surveyed by Mr. Chas. Dean, of Exeter, shows also a "Proposed Barnstaple Railway" extending from Exeter through Crediton and Barnstaple to Ilfracombe, which is marked as a "proposed Irish Packet Station."

In the year of the railway mania, 1845, an ambitious scheme entitled the Great West of England Railway was brought forward for a line from Basingstoke to Falmouth, with branches to Torquay and Ilfracombe. In the case of Ilfracombe the proposal was probably induced by the revival in that year of the Act of the Taw Vale Railway Company for a line from Crediton to Barnstaple, in conjunction with the projection by Brunel in the same year of a North Devon scheme for a railway from Taunton to Bideford.

So far as Ilfracombe was concerned nothing practical was done until some nine years later, about the time of the opening of the North Devon Railway (*i.e.*, the old Taw Vale re-named) to Barnstaple in August, 1854, when Mr. Robert Wreford, a solicitor of Exeter, commenced working with the idea of extending the railway to Ilfracombe. He was to some extent helped by local opinion, for the necessity of railway communication was becoming apparent, and although the scenery of the district attracted large numbers by steamer or coach, it was beginning to be recognised that the development of the town as a watering-place depended on its connection by rail with London and the rest of England. From 1854 onwards he was in constant correspondence with the three railways then interested in North Devon [*i.e.*, the Bristol and Exeter, North Devon, and London and South Western], and expended a considerable amount to promote his object.

Towards the end of the 'fifties a town's meeting was called at Ilfracombe to consider an offer made on behalf of Mr. Brassey, who was at that time working the North Devon line, to construct a railway to the town on condition that no opposition was offered. Although this characteristic proposition of the eminent contractor, whose hatred of contention was proverbial, came to nothing, it had the effect of arousing the interest of the Rev. Benjamin Price, incumbent of Christ Church, Ilfracombe, and afterwards Bishop Primus of the Free Church of England, to such effect that later he became actively associated with Mr. Wreford, and as chairman of the local committee remained at the head of affairs from February, 1861, until the passing of the Act under which the railway was ultimately constructed.

In the year 1860 proposals began to take a definite shape, stimulus being provided by the opening of the London and South Western route to Exeter, whence powers were obtained to lay down the narrow gauge over the Bristol and Exeter, Exeter and Crediton, and North Devon lines to Barnstaple. A committee was formed and surveys were undertaken to select the best route. Mr. Wreford had secured the friendship of the three companies interested, and hoped to obtain a rebate of £2,000 per annum from the South Western and North Devon Railways jointly, with a possible £500 from the Bristol and Exeter on through traffic. Messrs. Bircham & Co., the solicitors, and Mr. Errington, the engineer of the South Western Railway, were "acting cordially" with him, Mr. Brassey was his "powerful friend," and Captain Mangles and Mr. Tite, the chairmen of the South Western and North Devon lines respectively, visited Ilfracombe, and were in favour of the project.

A suitable route for the railway was not easy to find, owing to the difficult nature of the country behind Ilfracombe, a range of hills running approximately parallel

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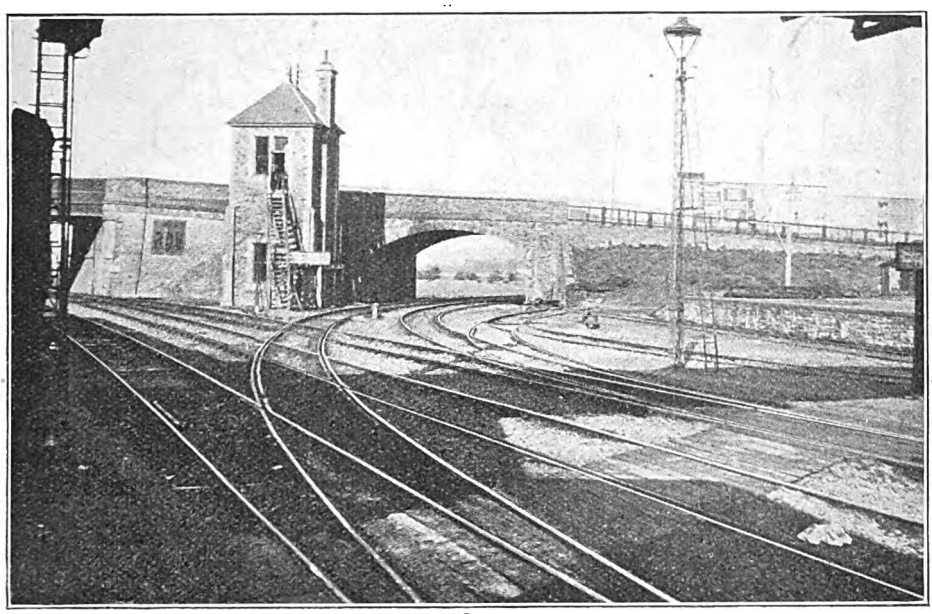
with and only two miles from the coast, at an elevation varying from about 600 to 800 ft., but even thus early there were two proposals in the field. The Eastern or Bittadon, route was the more direct, but involved exceptionally severe gradients if the conformation of the country were followed. Running almost due north from Barnstaple through the hamlet of Bittadon it crossed Berry Down at an altitude of about 800 feet, to enter Ilfracombe from the east and terminate above the harbour. The Western or Braunton route proceeded in a westerly direction

The respective merits of the two routes, however, caused some division of opinion, while the usual opposition from landowners was encountered. The most serious opposition the Western route had to face came from Sir William Williams, owner of Heanton Court, near Braunton, who remained for ten years a determined but honourable opponent of all schemes to carry the railway by way of that town. But the primary causes of failure in this year lay in the apathy of the inhabitants of Ilfracombe and in the lack of confidence with which Mr. Wreford was regarded



JUNCTION OF BARNSTAPLE—TORRINGTON (LEFT) AND BARNSTAPLE—ILFRACOMBE LINES.
Showing the old signal cabin, now replaced.

from Barnstaple and, after skirting the northern bank of the Taw for some distance turned northwards through the thriving town of Braunton. It then made a considerable detour to the west, following the line of least resistance and crossing the ridge at a much lower elevation than its rival, secured more favourable gradients. Mr. Errington, assisted by Mr. W. R. Galbraith, went over the country and selected the Braunton route as the one best adapted for the proposed line. The construction of the Eastern line was reported to be not absolutely impracticable, but too expensive to take up.

At the eleventh hour, after the plans had been deposited, he found himself unable to form a directorate, and consequently no application could be made to Parliament in the ensuing session.

Mr. Wreford's failure was connected with events which had taken place a short time previously in south-east Devon. In the promotion of the Exmouth Railway, sanctioned as a broad-gauge line in 1855, he had taken a very prominent part and acted as solicitor to the undertaking; but the acquisition of shares in the narrow-gauge interest, in view of connection with the authorised extension of the South

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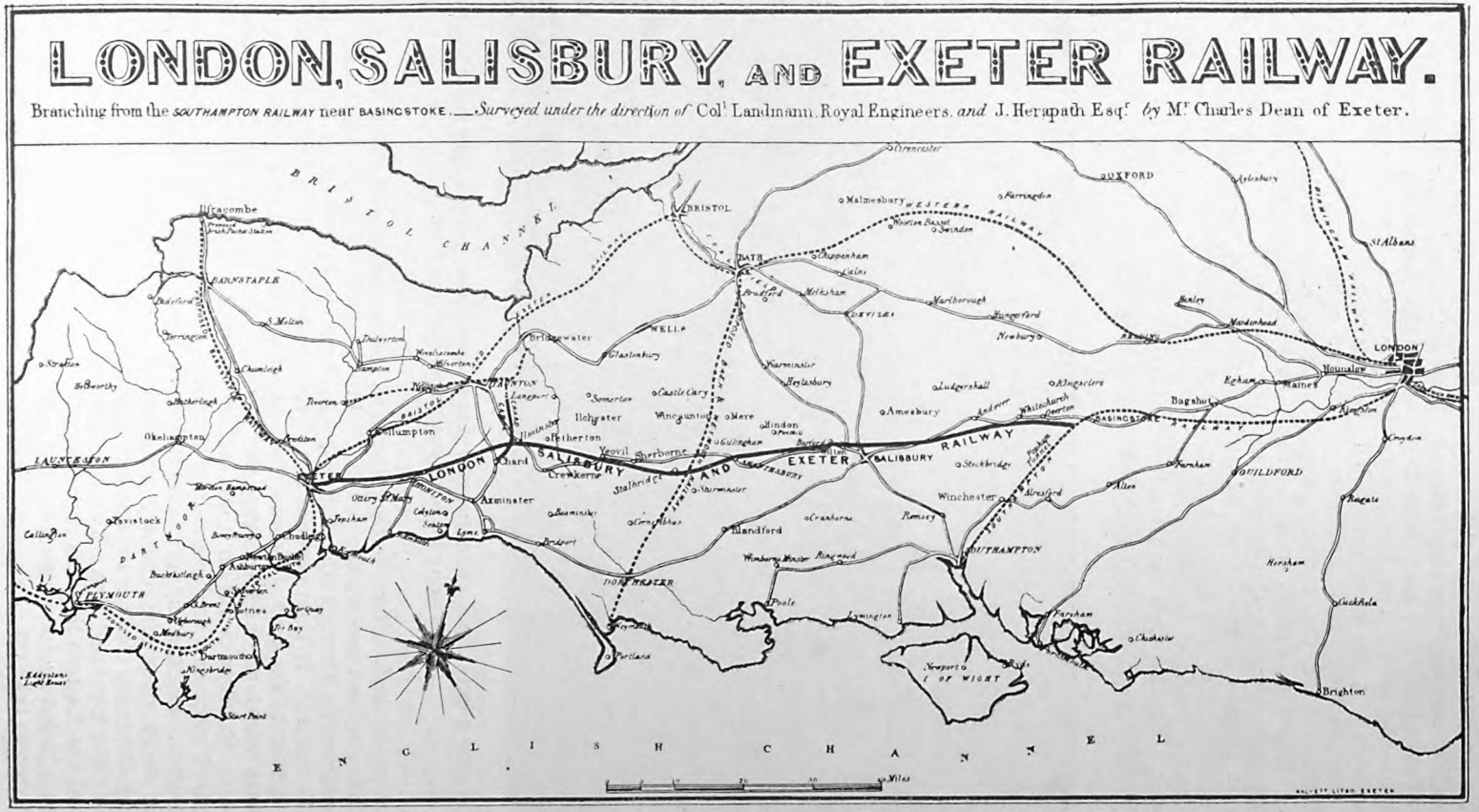

MAP OF THE LONDON, SALISBURY AND EXETER RAILWAY, SHOWING PROPOSED BARNSTAPLE—ILFRACOMBE RAILWAY.

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Western system to Exeter, brought about a change of opinion, and leave was granted for the construction of the line on the narrow-gauge. In the general turn-out of officials which ensued Mr. Wreford was, as he alleged, dismissed to make room for the nominee of the narrow-gauge party. As a result he incurred serious financial loss and his reputation as a capable railway promoter suffered; although he was persistent in his efforts to obtain redress, they were unsuccessful, and the loss of what he always regarded as his line remained a bitter disappointment to him.

Early in 1861 means were sought to remove the causes of weakness of the previous year, and accordingly the Rev. Benjamin Price was appointed chairman of the local committee. He at once set to work to overcome the prejudice against Mr. Wreford, and obtained such testimony as to his sincerity and integrity, notably from the chairmen of the North Devon and Bristol and Exeter Railways, as effectually removed all doubt as to his honesty of purpose. From Messrs. Bircham & Co. he obtained, in addition, advice as to the best method of procedure; although not at first officially connected with the undertaking, this firm later became actively associated with the promoters as their solicitors, and no account of the inception of the Ilfracombe Railway would be complete without reference to the large and arduous part taken by them. The bulk of the work fell on the late Mr. Frederick Bircham, who was absolutely sincere in his efforts to promote the Ilfracombe cause.

But to return to 1861. At a meeting held to secure the unanimous adoption of the best route, the following route was selected:—From a junction with the North Devon line at Bishops Tawton (about a mile south of the present junction station at Barnstaple), round Barnstaple by the east and north, and through Braunton to the Fox Hunters' Inn near Dean, thence by the valley leading to Trimstone, and through a tunnel into the Folly and Slade Valleys to a terminus at Higher Horne, with an extension through a tunnel at the back of the town to the harbour. This route differed from that of the previous year in that it tunnelled the ridge and avoided the long detour to the west from the Fox Hunters' Inn, thereby saving two miles.

On the completion of the survey of this line, undertaken by Mr. Galbraith, application was made to the South Western Company for support in carrying a Bill through Parliament, and for such assistance as would enable a contract for the construction to be placed. The South Western Board were, however, *in medias res* of the negotiations with the North Devon Railway for the acquisition or leasing of that line, and doubtless deemed it prudent to assure their position at Barnstaple before undertaking fresh liabilities in respect of an extension beyond that town. This overture was therefore declined, but the reply given was most encouraging and left the applicants hopeful of success in the following year.

Towards the end of 1861 a small cloud appeared on the horizon in the shape of the arrival at Ilfracombe of a fresh set of engineers. It was currently reported that this indicated a revival, under Great Western auspices, of the old North Devon scheme of 1845 for a line from Taunton to Barnstaple, with the addition of an Ilfracombe extension. Probably relying upon the fact that the broad-gauge interests controlled from Paddington had hitherto done nothing for North Devon, although until 1860 they had had the whole field to themselves, the authorities at Waterloo did not regard the matter very seriously; at least, such was the opinion in Ilfracombe, for letters urging definite and immediate action to secure the ground were written to both the South Western and North Devon companies. As events proved, this apprehension of the promoters was unfortunately justified, for as a result of this intervention of the Devon and Somerset, as the new project was called, Ilfracombe was deprived of its railway for years, and much useless expenditure was incurred.

In the early part of the next year, 1862, Mr. Wreford suggested making immediate arrangements with the landowners. The committee, however, in view of Sir W. Williams' opposition, and in view of a pledge given to him the previous year, deferred meeting the landowners until the impracticability of another route could be shown, and, meanwhile, they worked to enlist the support of Barnstaple.

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In July the agreement whereby the London and South Western leased the North Devon line was completed, and the narrow-gauge was forthwith laid down to Barnstaple, leaving the South Western Board free to listen to the Ilfracombe proposals, which were laid before them by a deputation which visited Waterloo. In September a reply was received suggesting that it would be desirable if the country could be again looked at with a view to modifying the steep gradients and sharp curves; consequently Mr. Galbraith, who had succeeded Mr. Errington as engineer of the South Western, was authorised to survey the country through Bittadon and Berrynarbor. He reported that he estimated the cost of the line, involving five tunnels, a lofty embankment, several viaducts and heavy cuttings, at £220,000 against £160,000 for the Braunton line, or £180,000 if the harbour branch were included; he considered the difference too great to pay for the easier gradients obtained by the heavier engineering works on the Bittadon route, and accordingly recommended the adoption of that *via* Braunton. The South Western Board thereupon advised their proprietors to sanction an arrangement whereby that company was (1) to lease the Ilfracombe line at a rental of 55 per cent. of the, receipts; (2) to pay a rebate of £2,000, to be continued only so long as that or a less amount was required to pay a dividend of 4½ per cent.; and (3) to have the option of purchase on terms securing 4½ per cent. to the Ilfracombe shareholders.

In January, 1863, the necessary deposit in Chancery was made and everything promised hopefully for the ensuing session. The Bill of "The Ilfracombe Railway," which proposed a capital of £180,000, with borrowing powers of £60,000, named Benjamin Price, William Huxtable, William Stanney Toms, Joshua Avery, and Richard Huxtable as the first directors, and Messrs. Bircham & Co., jointly with Mr. Wreford, as solicitors. It proposed a line from a junction with the North Devon Railway at Bishops Tawton, passing through the parishes of Barnstaple, Pilton, Ashford, Heanton Punchardon, Braunton, and West Down, with a tunnel through the ridge and a final drop of 1 in 33 for 1 mile 7 furlongs to a terminus at Ilfracombe near the Old Barnstaple Road. In Parliament it was supported by the South Western Railway, by Lord Clinton, and by Mr. Tite and Mr. Buller, the chairmen of the North Devon and Bristol and Exeter companies respectively, but was thrown out by the Lords Committee on April 25, on the opposition of Sir Wm. Williams, whose petition asserted that a cheaper and better line could be made via Bittadon. Plans for such a line were put forward by Mr. Whitley, the agent of Sir William, and by Mr. Fowler, the celebrated engineer, who, in his evidence, stated that the gradient of 1 in 33 was not consistent with safety, though he himself subsequently constructed a line with a gradient of no less than 1 in 27! Their Lordships, however, reported that a railway was required, and the local supporters returned to the west "in fine heart, repulsed, but not beaten," and hopeful of carrying the line next year, unopposed.

Disappointment at Ilfracombe and Braunton was intense, and the receipt of the news occasioned scenes which are still in the memory of the older inhabitants. At Ilfracombe indignation was vented against a prominent opponent of the railway, several persons, led by Mr. Toms, hastening to his house and rapping violently at the door to the alarm of his wife, the good man not being at home; with the assembly of a crowd the excitement increased, and some windows were broken, but the affair was unduly magnified by the action of a local magistrate, who seized upon the occasion to read the Riot Act. Calmer reflection stigmatised the whole business as ridiculous, but ended in the appearance of six "respectable young men" before the magistrates at Barnstaple by whom they were committed to the Assizes; justice was finally satisfied by the imposition of a fine of £100 between them to be devoted to charitable purposes.

At Braunton the inhabitants marked their displeasure by constructing an effigy of Mr. Whitley, whose evidence had been so instrumental in securing the defeat of the Bill, and whose alternative route via Bittadon left Braunton entirely in the cold. He out-manœuvred his deriders rather brilliantly by capturing his effigy, probably hoping to ascertain from the clothing who were the perpetrators; it was humorously suggested by Mr. Wreford that he should be prosecuted for the theft.

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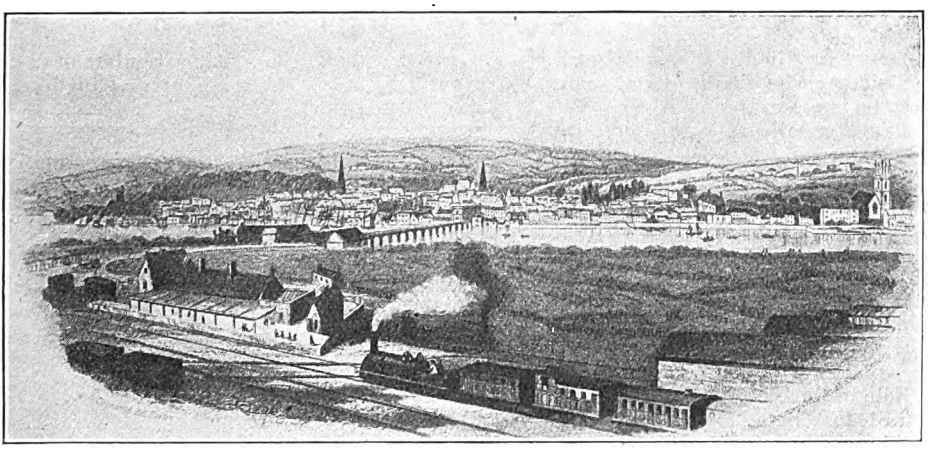
The excitement caused by the "riot" had barely subsided when the definite projection of the Devon and Somerset in the following autumn provoked considerable discussion and consequent ill-feeling between the respective partisans. At a private meeting of supporters held at Ilfracombe in November the proceedings were scarcely enthusiastic, and the only resolution come to was to recommend the inhabitants not to pledge themselves to either scheme until both had been fairly laid before them; however, a few days later it was announced that they had decided in favour of the Devon and Somerset.

tages, they suggested the adoption of the Eastern route, the opposition of Sir Wm. Williams, and the probability of the Devon and Somerset applying for power to construct a line to Ilfracombe, influencing their decision. This was the route suggested by Mr. Whitley and confirmed by Mr. Fowler as being the better and cheaper, but when the survey came to be made Mr. Galbraith found that, with all the economy he could introduce, the line could not be made for less than £200,000, as against the £166,700 of Mr. Whitley. Mr. Galbraith's estimate was confirmed by those of the several contractors who were invited to tender for



BARNSTAPLE IN THE EARLY DAYS.

(From an old print.)

Negotiations with the South Western Company had meanwhile been proceeding throughout the summer, and an event may be here mentioned, which, although trivial in itself, showed that the authorities at Waterloo were fully alive to the growing importance of Ilfracombe: early in the June of this year, 1863, the West of England express appeared with a new board lettered "EXETER AND ILFRACOMBE," the final stage being performed by coach from Barnstaple.

In September the South Western Board intimated their desire to the promoters that another application should be made to Parliament in the next session, and although it was stated that the Western line appeared to possess greater advantages, they suggested the adoption of the Eastern route, the opposition of Sir Wm. Williams, and the probability of the Devon and Somerset applying for power to construct a line to Ilfracombe, influencing their decision. This was the route suggested by Mr. Whitley and confirmed by Mr. Fowler as being the better and cheaper, but when the survey came to be made Mr. Galbraith found that, with all the economy he could introduce, the line could not be made for less than £200,000, as against the £166,700 of Mr. Whitley. Mr. Galbraith's estimate was confirmed by those of the several contractors who were invited to tender for the construction of the line; Messrs. Robt. Sharpe & Sons putting the cost at £212,000, Messrs. Brassey at £213,000, and Messrs. Waring at £220,000.

The proposed line left the North Devon Railway as before, about a mile south of the present junction station, and running on the east side of the town of Barnstaple, passed through part of the parish of Pilton, Sherwell, Marwood, and Bittadon. It then descended for 3¼ miles at 1 in 40 to a terminus at Ilfracombe, 150 feet above the sea, with a tramway down to the harbour with a gradient of 1 in 8. In the length of 12¼ miles were included two tunnels and two heavy viaducts, one of the latter being 168 feet high.

The South Western Company had agreed

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to subscribe £50,000 deferred shares to carry no interest until 4 per cent. had been paid on the remainder of the capital, and were to have power to provide a further £60,000 of the capital of £210,000 as proposed by the Bill of 1864. They were also to lease the line at a rental of 55 per cent. of the gross receipts, to appoint three of the six directors, and to have the option of purchase on terms securing 4½ per cent. to the Ilfracombe company's shareholders. The directors named were Benjamin Price, William Huxtable, and William Stanney Toms for the shareholders; and Charles Edward Mangles, Ralph Heneage Dutton, and Edward John Hutchins for the London and South Western Railway.

(*To be continued.*)

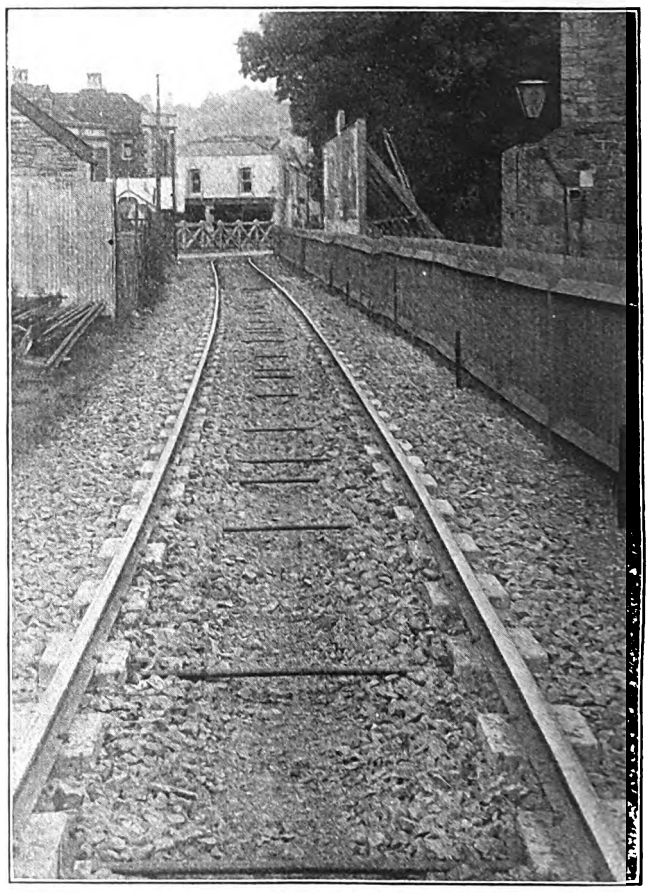
CONCRETE BLOCK SLEEPERS FOR SECONDARY RAILWAYS.

THANKS are due to Lieut.-Colonel H. F. Stephens, R.E. (R.), for particulars of concrete block sleepers he is using on some of the light railways in the United Kingdom with which he is associated. These blocks are usually 12 by 20 by 6 in., spaced 2 ft. 2 in. apart when supporting 65-lb. flat-bottomed rails. When employed for 80-lb. rails, two more blocks are used for each 30-ft. length. The maximum per axle load in the case of the 65-lb. rails is 14 tons; for 80-lb. rails it is 18 tons.

A wooden trenail is placed in a hole in the block to receive the rail fasteners, which are either dogs driven into the trenails, or fangbolts fitted in holes bored in the plugs.

Tie-bars, as a rule made from old signal rods, are fitted four to the 30-ft. rail, or as often as found desirable, depending upon curvature and other factors. We understand that, up to the present, a considerable distance of permanent way has been laid with these blocks and, so far, they have given no signs of failure, although subject in places to speeds up to 30 miles per hour.

The blocks are cast in ordinary moulds and do not involve any special process. In fact, it has been found desirable to set the men upon their production on days when other work is not practicable, owing to rain or other causes. One ton of cement will make about 86 blocks.



PERMANENT WAY LAID WITH CONCRETE BLOCK SLEEPERS

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PRESENTATION TO SIR JAMES B. BALL,

CHIEF ENGINEER,

LONDON, BRIGHTON & SOUTH COAST RAILWAY.

SIR JAMES B. BALL,

Late Controller of Timber Supplies.

IN recognition of his services as Controller of Timber Supplies during the War, Sir James Ball, was recently presented by the Home-Grown Timber Merchants' Advisory Committee with an oil painting of himself by Mr. Stanhope Forbes, R.A. The portrait reproduced above bears the following inscription :—"Presented by the Home Timber Trades Advisory Committee of the United Kingdom to Sir James Ball as a mark of respect and esteem, and in recognition of his successful work as Controller of Timber Supplies during the Great War, October 29, 1919." The presentation was made at the Grosvenor Hotel, under the chairmanship of Mr. Donald Munro, O.B.E.

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Irish Cross Channel Service.

LONDON & NORTH WESTERN RAILWAY.

IN April, 1914, the London and North Western Railway, in view of the rapid growth of the Holyhead and Greenore service, decided to order a new ship to run in conjunction with the ss. "Greenore" and ss. "Rathmore," and an order was placed with William Denny & Brothers, Limited, of Dumbarton, for a somewhat similar vessel to the "Greenore."

Owing to the war, the building of the ship was delayed; but soon after the armistice the builders proceeded with the work, and the new vessel, which has been named "Curraghmore," has now been delivered and has taken her place, for the time being, on the Holyhead–Dublin service.

Her principal dimensions are:—

Length overall	...	316 ft.
Breadth ...	...	40 ft.
Depth, moulded	...	15 ft. 6 in.

Built to Lloyd's special class and to Board of Trade conditions, the new vessel has been designed to meet the general requirements of the Irish Channel passenger, cattle and cargo service. She has a Board of Trade Passenger Certificate for 495 first-class passengers and 581 third-class and carries a crew of 54.

The large deck-houses on the Poop and Bridge Decks, as well as the 'tween decks space and lower deck amidships, are fitted up for the accommodation of first and third-class passengers, and the open space on the main deck is arranged for the carriage of horses and cattle. The hull is sub-divided by a number of transverse watertight bulkheads which extend to the main deck. The propelling machinery consists of twin screw geared turbines of Parsons' latest type, supplied with steam from five Babcock & Wilcox water-tube boilers, and the speed of the vessel with full deadweight on board is 21½ knots.

The "Curraghmore" is fitted with Marconi wireless installation, submarine signalling apparatus, and Stone's system of hydraulically operated watertight doors, which can be manipulated direct from the navigating bridge by the officer on duty, thus ensuring great security. The latest type of Welin davits are fitted for launching the lifeboats, and are capable of putting them out against a considerable list; and lifebelts and buoyancy apparatus are provided in accordance with the latest Board of Trade requirements.

Sleeping accommodation is provided for 130 first-class passengers in state rooms, and the ladies' cabins on the upper main and lower decks. The two special state-rooms fitted on the "Greenore" have been in such demand, that, in addition to the ordinary cabin accommodation on the new vessel, there are two of these special cabins, which may be reserved for first-class passengers at a nominal extra charge. These cabins are fitted with very comfortable single bedsteads, writing table, easy chairs, sofa and portable electric lamps. The sides are panelled with tapestry and upholstered in damask, and are as luxurious as any cabins on an ocean liner.

The first-class dining saloon, which is situated on the forward main deck, provides seating accommodation for 48 persons; it is lined with polished natural oak and upholstered in blue. A pleasing feature in this saloon, and also in the smoke-room, are the pictures, which are copies of old masters. A handsome writing cabinet is placed in the forward end, and close to hand is a letter and telegraph box which, by an arrangement with the Postmaster-General, is cleared immediately on the ship's arrival, thus ensuring the despatching of telegrams and letters without delay.

A first-class smoke-room, lined in light oak and polished, is situated on the awning deck, and has sofa seats with backs and divisional arms spring stuffed, and covered with the best morocco leather, tables and chairs are also provided. The floor is laid

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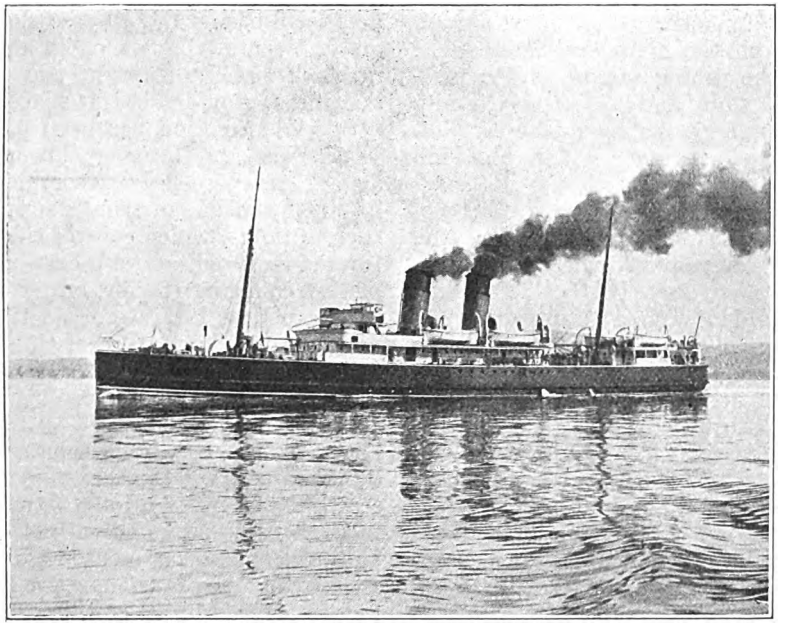

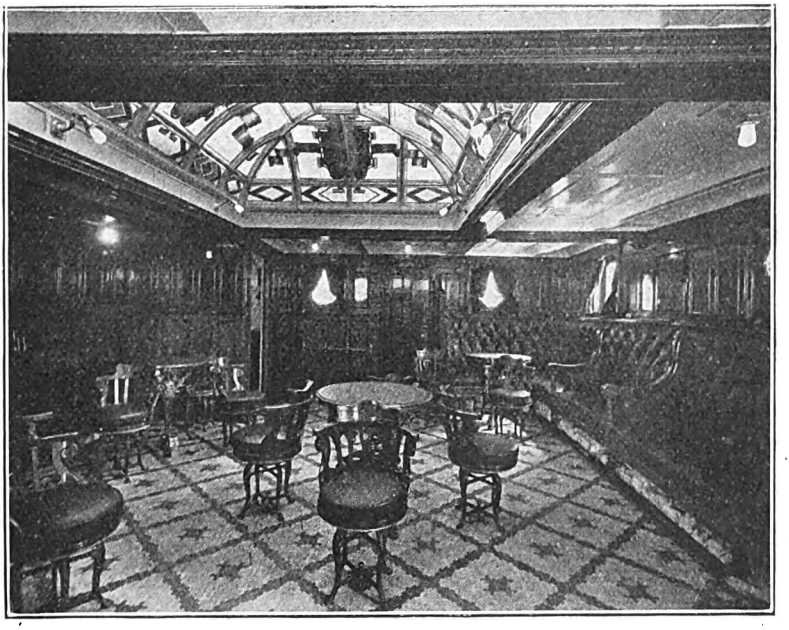

TWO VIEWS OF THE NEW STEAMER "CURRAGHMORE," FOR THE HOLYHEAD—GREENORE SERVICE: LONDON & NORTH WESTERN RAILWAY.

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with indiarubber tiles, while overhead is a very handsome dome, in which is fitted an electric air extractor for keeping the apartment clear of smoke.

Situated on the main deck amidships, adjoining the dining saloon, is the first-class ladies' cabin, and it is very tastefully decorated in dark mahogany and upholstered in green; further, it is provided with a handsome writing desk.

The ladies' deck cabin in white enamel and walnut is immediately above, the upholstery being covered with very handsome chintz covers. This compartment is also provided with a beautiful dome, which when illuminated at night-time gives a pleasing effect.

Lavatory accommodation throughout the ship is furnished in the very latest style, the sides being covered with variegated marble and the floors handsomely tiled, while the fittings are all electro-plated.

Accommodation for third-class passengers and cattle dealers is fitted up aft on the lower main and poop decks, and consists of large open cabins, a separate compartment being provided for the cattle dealers.

A dining saloon fitted in light oak and suitably upholstered is provided in the third-class accommodation. There are a number of sleeping cabins fitted with portable wash-basins and all the usual fittings, and a separate ladies' cabin upholstered in black mohair, with the necessary conveniences, provided in this space.

Special attention has been paid to the ventilation and heating throughout the ship. The passenger accommodation is heated by means of trunks supplied from thermo tanks, which control the temperature as required, and are capable of completely changing the air, either by supply or exhaust, at the rate of six times in an hour. A special feature of this system is that it can be utilised for warming the rooms in winter and cooling them in summer.

The galley has been constructed and designed to meet the requirements of the service, and in addition to the ordinary fuel ranges, is provided with electric grills and other modern methods of cooking. Electrically-driven fans are fitted in trunks leading to all cattle spaces, and it may be added that the vessel is fitted up with a complete installation of electric light to all passenger, crew and cargo spaces.

YARD PILOT AT BRIGHTON WORKS.

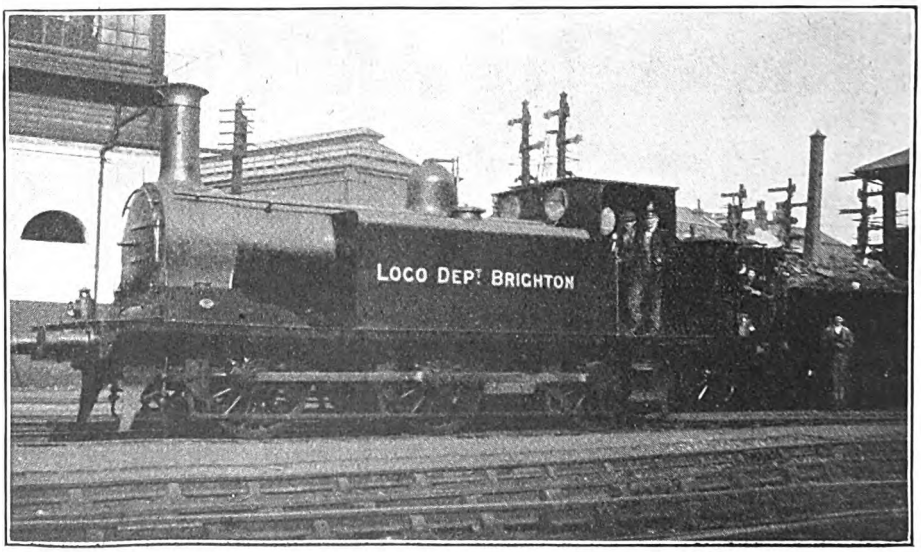

Photo.] [*A. B. MacLeod.*

LONDON BRIGHTON & SOUTH COAST RAILWAY.
E1 Class 0-6-0 Tank Engine (formerly No. 99).

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The WHY and the WHEREFORE

Readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to locomotive sheds and to the dimensions of railway rolling stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Queries respecting British Locomotive Practice and Performance should be sent to Mr. Cecil J. Allen, c/o the Editor of the RAILWAY MAGAZINE, *30 Fetter Lane, Fleet Street, London, E.C.4. Queries should not be of purely local interest. No reader should forward more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history and the like,* RAILWAY MAGAZINE *readers should consult the pages of the "Railway Year Book," the twenty-second annual edition of which, published in April, 1919, is out of print but a new one is in preparation, in readiness for publication in April, 1920.*

Compressed Air Locomotives.

Particulars of the "new secret pneumatic system in Italy," to which you direct attention, as given in the daily press, do not suggest anything either wonderful or likely to be satisfactory. A steam locomotive will work with compressed air, with little modification, but you have only to realise the enormous volume of steam—made as required, and therefore only occupying space as water and coal—which is used by an ordinary locomotive, to realise that the demand for compressed air would be very great. Enormous power station capacity would be required to feed a busy line, while, unless the air were compressed to a very high pressure (and that means power—coal or electric at the compressor station), no engine could run very far on each supply, if it was doing really hard work. Even if the scheme were practicable, we should estimate that electrification would be cheaper and more satisfactory.

[Reply to R. N. MICKLEWOOD.]

St. Pancras-Southend Expresses.

It is true that most of these trains are somewhat slow between St. Pancras and Barking, especially since the withdrawal of certain local trains during the war has caused additional stops to be inserted in the through train schedules in compensation. It has to be borne in mind, however, that although at times of special pressure full loads can be secured from St. Pancras and Kentish Town to the Southend stations, nearly all the intermediate stations on this section also produce traffic and require consideration. The route is, furthermore, a very hard one in regard to gradients. There have been at various periods trains making only a few calls between Kentish Town and Barking. In fact, the 6.5 p.m. from Southend is even now a good train beyond Barking, as it calls only at Leyton, South Tottenham and Upper Holloway to Kentish Town.

[Reply to "MIDLANDITE."]

Double-Heading.

Several companies now make a practice of putting the more powerful engine in front in cases of piloting. We do not consider that the principle involved is one of great importance, but we take it that the idea is to prevent, at high speed, the possibility of the train engine "pushing" the pilot engine (which could only happen if the latter were not developing sufficient power to propel itself at that speed), in which case there might be a tendency to derailment. It is generally supposed that the Loughor accident on the Great Western Railway, where a 0–6–0 saddle-tank was piloting a 4–4–0 express engine at speed, was caused in this way. The practice referred to is also adopted on the principle that the regular driver should retain the

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driving responsibility, and as an assisting engine is generally the smaller, this also results in the more powerful engine leading.

[Reply to "SOUTH COAST."]

South Eastern and London, Chatham and Dover Railways Amalgamation.

The South Eastern and London, Chatham & Dover Railways undertakings commenced to be operated as one concern, under the direction of a Managing Committee, as from January 1, 1899. This arrangement was confirmed and sanctioned by Parliament, August 5, 1899, on the passing of the "South Eastern and London, Chatham & Dover Railway Companies Act, 1899." Several *brochures* and pamphlets have been published dealing with these railways, but all are now of considerable age and out of print. Other proposals for amalgamations, involving one or both of these railways, have been made in the past, but we cannot recollect any on the lines you suggest.

[Reply to "R. O. W. V."]

Viaduct near Motherwell: Caledonian Railway.

We are indebted to Mr. D. A. Matheson, General Manager, Caledonian Railway, for the following information in reply to your query:—"The remains of this viaduct are the stone piers of what was known as the Jerviston Viaduct, near Motherwell, carrying the old Wishaw & Coltness Railway over the Calder Valley and the South Calder Water. This viaduct, which was for a single line of railway, had 10 spans of 100 ft. each, and was constructed under the Wishaw & Coltness Railway Act of 1829. The piers and abutments were built of stone, the substructure of each span consisting of timber laminated arch ribs with timber spandrils. The masonry piers are now in course of demolition."

[Reply to "DALRY."]

Gradients on Continental Railways.

The gradients of Continental railways are very seldom made public, and definite particulars are not easy to get. So far as heavy main line traffic is concerned, the steepest gradients occur on the Vienna-Trieste railway and the Swiss Gothard lines, each having about 30–35 miles of line at 1 in 39/40, and the Norwegian Bergen-Christiania Railway, with 48 miles at 1 in 46. Two Swiss narrow gauge lines, the Rhaetian, with 1 in 22, and the Bernina, with 1 in 14, are actually the steepest, but the traffic handled is only tourist in character. The Bernina and Gothard lines are electrically worked. Gradients steeper than 1 in 60 occur throughout Switzerland.

[Reply to R. COUSENS.]

The Fastest Express.

It is impossible to reply to a query of this kind, on the basis of gradients and traffic difficulties. Probably trains such as the London–Plymouth, Exeter and Bristol non-stops on the Great Western Railway, would take precedence; but these routes are not, on the whole, specially difficult, and the locomotives used are big. Other lines may not show up quite so well, but the work is frequently quite as meritorious in view of gradients and traffic hindrances and the size of the engines employed.

[Reply to W. I. PEARKS.]

Exeter-Plymouth Section: London and South Western Railway.

Through St. David's, Exeter, to Cowley Bridge Junction, and also between Devonport Junction and Friary Junction, Plymouth, London & South Western Railway trains travel over the Great Western Railway, though in both cases the directions of travel with regard to London are opposite to those of Great Western trains. Information of this class can be obtained from THE RAILWAY YEAR BOOK. London & South Western Railway 4–6–0 engines do not work west of Exeter.

[Reply to R. W. HANBRIDGE.]

South Eastern and Chatham Railway Locomotives.

YOU are correct in stating that the large superheater 4–4–0 engines of this railway are numbered 760–781, though the 772–781 series were delivered and in service before those numbered 760–771. Presumably the engine you saw was the one concerned in the Paddock Wood accident. From later information we note that a few of the R.O.D. 2–8–0 engines are being utilised by the South Eastern and Chatham Railway.

[Reply to "CENTUAR."]

Flinders Street Station: Melbourne.

This station has 11 through platforms and 4 terminal platforms, while the adjacent Spencer Street Station has 8 terminal platforms and 2 for use by through trains passing over the 4-track viaduct connect-

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ing the two stations. It is estimated that about 170,000 passengers pass through the barriers at Flinders Street daily, the number being greatly increased at special periods, while the total suburban traffic in the Melbourne area is about 90,000,000 passenger journeys annually.

[Reply to G. BLACKBURN.]

Header Discharge Valve.

The device of which you send a sketch is a "header discharge valve," now fitted to Great Central Railway superheater engines. Its object is to ensure the complete discharge of steam from the steam chests and the superheater elements when the regulator is closed, in view of the relatively considerable space for steam which these afford on the cylinder side of the regulator. We do not recognise the other device you mention from your description.

[Reply to "SUPER G.C.R.]

D.X. Type Engines, London and North Western Railway.

This is the classification of a large number of 0-6-0 tender engines on the London and North Western Railway. Most of them are vacuum brake fitted, and they may be found frequently at work on branch line passenger trains. A commencement has now been made with breaking them up. The history of the class was dealt with at length in a reply to a querist which you will find in the April, 1917, issue.

[Reply to D'ARCY EDMONDSON.]

"Oban Bogies."

These engines received attention in Mr. Ahron's articles on "Locomotive and Train Working in the Latter Part of the Nineteenth Century," the Caledonian Railway being dealt with in THE RAILWAY MAGAZINE for March, April, May and June, 1918. All of these are still in print. The "Oban bogies" were described and illustrated in the April, 1918, number. North British Railway locomotives will be considered in due course.

[Reply to D. I. AITKEN.]

A Locomotive Mystery.

Theoretically you are correct as regards the high nominal tractive effort of the four-cylinder 4-6-0 locomotives you name, but in practice, although many ingenious features are incorporated in their design, they cannot be held to display any proportionate merit in their performance on passenger trains. It is generally held that they are over-cylindered in proportion to their steam-producing capacity.

[Reply to "FRETON."]

Great Eastern Railway Ferry Services.

October 1, 1908, is the date of the withdrawal by the Great Eastern Railway of its passenger steamboat ferry services across the Thames from North Woolwich to Woolwich. This service had been in operation over 40 years. The service had long been carried on at a loss, but it was a great public convenience until the opening of the free L.C.C. ferry service rendered it more or less superfluous.

[Reply to R. G.]

London and North Western "Lady of the Lake" Class Engine.

The dial or disc immediately above the number plate is a *facsimile* of the medal which the engine in question gained when exhibited in London in 1862. There were two other locomotives which had been awarded medals similarly fitted, viz. :— No. 507, *Marchioness of Stafford* (London, 1885), and No. 2054, *Queen Empress* (Chicago, 1893).

[Reply to T. J. S. TIMMIS.]

South Eastern and Chatham Railway Locomotives.

We understand that Class A applies to the Kirtley tank engines Nos. 524-9, 560-9 and 571, Nos. 658-675 being Class R (L.C. and D. section), and Nos. 696-710, Class R1 (L.C. and D. section). Also that Nos. 600-9 are Class T as stated, Class S being the saddle tanks converted from Wainwright 0-6-0 engines.

[Reply to J. MAY, Junr.]

Left-Hand Running on Foreign Railways.

With the notable exception of Germany and Austria, in nearly all European countries the trains keep to the left. Why this should be the opposite of vehicular traffic does not appear very clear, but many European railways when first opened adopted English standards of operation, and the systems developed along these lines

[Reply to R. COUSENS.]

Cost of Railways in Great Britain.

Your first query covers far too wide a field to admit of reply. We can hardly

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get nearer to the figure you require than to state that, excluding nominal additions, the capital represented by the railways of the United Kingdom is about £1,150,000,000, most of which has been spent in constructing, working and equipping the various systems.

[Reply to "PORT ELIZABETH."]

"Clan" Class Engines, Highland Railway.

There is little or no resemblance between these engines and the six 4–6–0 engines built for the Highland, and subsequently transferred to the Caledonian Railway, on which system they are numbered 938 to 943 inclusive. Probably you saw one of the "Clan" class engines being brought up "dead" on a goods train *en route* from the makers to the Highland line.

[Reply to M. B.]

Locomotive Wind Vanes.

Besides the wind vane near St. Pancras Station to which you refer, there is one possessing considerable historic interest upon the roof of the administration buildings of Stratford Works, Great Eastern Railway. This is in the form of an Eastern Counties locomotive of the period when it was erected.

[Reply to D. A. EDMUNDSON.]

Baker Street Station.

There were, of course, platforms at Baker Street for the St. John's Wood line trains when traffic on that section was inaugurated in 1868, so that the original "Extension" line station dates from that period, though it has since been entirely remodelled and enlarged.

[Reply to J. V. H.]

Steam.

We do not understand your query in regard to steam leaving a locomotive boiler. If it is the time of transit between regulator and cylinders that you are anxious to ascertain this, of course, varies according to the design and length of the steam passages, and is considerably increased when a locomotive is superheated.

[Reply to E. W. ARDRON.]

Forth Bridge.

Rumours such as you mention may be disregarded. The bridge is well looked after, and is continually receiving repair attention, a considerable staff being directly concerned. There is certainly no truth in any suggestion that it is showing weaknesses and that a new bridge to replace it is contemplated.

[Reply to "ULTIMA THULE."]

Non-Stop Runs.

Pride of place belongs to the 225¾ miles non-stop journey of the 10.30 a.m. Riviera express from Paddington, Great Western Railway, first stop Plymouth (North Road). A complete list of all non-stop runs exceeding 100 miles in length was given in the "Summer Train Services" article in the October issue.

[Reply to "SHUNTER."]

Largest and Heaviest Engines on the South Eastern and Chatham Railway.

Excepting the new Maunsell engines 790 and 810, the palm for express engines of course goes to the 760-781 large-boilered 4–4–0 series (97¾ tons in working order, with tenders), and for tank engines to the superheater 0–6–4's (70 tons).

[Reply to H. D. G.]

Midland Anglo-Scottish Services.

See reply to "L. W." in the October issue. These arrangements have been made by the Railway Executive Committee in order to carry traffic by the shortest or most convenient route, and also, as far as possible, to prevent wasteful duplication of facilities.

[Reply to V. SPEARS.]

The Largest Junction.

Clapham Junction is certainly the largest in view of number of trains and number of platforms. It is, however, a double station, owned by two railways, each working its own traffic virtually as if the stations were quite distinct.

[Reply to W. I. PEARKS.]

Slip Coaches, Great Western Railway.

Clerestory slip brake coaches on the Great Western Railway have additional vacuum cylinders mounted along the roof in order to provide a reserve of brake-power after the slip portion has been separated from the main train.

[Reply to CHARLES FORDER.]

"Pacific" Type Locomotives.

No other standard gauge 4–6–2 tender engine exists in the British Isles than the Great Western Railway *Great Bear*, No. 111. We do not undertake to answer questions relating to locomotive names or numbers.

[Reply to "SWINDON."]

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"The Great Bear," G.W.R.

This engine has recently been through the shops for general overhaul, and is now again at work. A large colour plate of *The Great Bear* in her new livery will be the frontispiece to the January, 1920, RAILWAY MAGAZINE.

[Reply to D. W. L.]

Speed of Great Western Railway Trains.

WE can only suggest that sectional schedules on the London–Birmingham route are governed by traffic considerations and not by engine capability. The work on each stage is well within the powers of the engines concerned.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

Mixed Traffic 4–6–0 Locomotives: North Eastern Railway.

No. 797 is one of the numerous 4–6–0 engines classed as for mixed traffic and express goods duties, for which reason a medium coupled wheel diameter (6 ft. 1¼ in.) is adopted.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

Sleepers.

An untreated or white sleeper of standard dimensions—9 ft. by 10 in. by 5 in.—weighs 120 lb., and after creosoting 147 lb. The latter figure will vary slightly according to the amount of creosote absorbed by the sleepers.

[Reply to G. W. M. R.]

The Earliest Bogie Locomotives.

You are mistaken in assuming that the early broad gauge locomotives were fitted with bogies. They certainly were supported by four wheels at the chimney end, but these were fixed and had no radial action.

[Reply to JOHN WROTTESLEY.]

Mechanical Stokers for Locomotives.

These have been referred to and in a few instances described in back numbers of THE RAILWAY MAGAZINE, but not lately. As opportunity arises we hope to deal therewith in due course.

[Reply to R. N. MICKLEWOOD.]

Great Northern Railway Locomotives.

There are a number of 0–4–2 tender locomotives still in existence on this railway, but the majority of these are now on the duplicate list, with a view to their being broken up shortly.

[Reply to D'ARCY EDMONDSON.]

Railway Employees in the United Kingdom.

Before the war there were over 600,000 employees in the service of British railway companies. The number is probably in excess of this now.

[Reply to "PORT ELIZABETH."]

Canadian Pacific Railway Codes.

For inter-departmental communication, the company uses its own private code, but for outside work use is frequently made of one or other of the various codes in general employment.

[Reply to GUNNER WARD.]

Glasgow and South Western Railway 4-6-0 Engines.

These are all two-cylinder locomotives. 4–4–0 No. 11 is the only four-cylinder engine on the Glasgow & South Western Railway.

[Reply to "A. W. A."]

Locomotive Weights.

We believe that the weight of the superheated North British "Atlantic" engines slightly exceeds that of the Caledonian "Cardean" class, in each case without tender.

[Reply to "CARDEAN."]

"Claughton" Class Engines, London and North Western Railway.

There are 33 named and 27 unnamed locomotives of this class now in service on the London and North Western Railway.

[Reply to M. B.]

Great Western Railway Locomotive Chimneys.

Several readers point out that 2–8–0 engine No. 4700 has a tapered chimney of the pattern now standard.

[Reply to J. B. L. C. PRIDIAUX.]

The "Largest Railway in Scotland."

On a route mileage basis, which we presume is what you mean by "largest," the premier position must go to the North British Railway.

[Reply to "CARDEAN."]

4–2–2 Engines, Midland Railway.

The most recent official information gives the number of engines of this type as 95, and so far as we are aware, none of them have yet been scrapped.

[Reply to "SINGLE DRIVER."]

Midland Railway Locomotives.

There are no 4–6–0 engines at work on the Midland Railway.

[Reply to D. W. L.]

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South Devon Widening: Great Western Railway.

Widening of the South Devon section through Dawlish was commenced in 1905 and completed 1906.

[Reply to "LADY HENDERSON."]

London and South Western Railway Locomotives.

You are presumably referring to the injector which occupies the position described in rear of the coupled wheels.

[Reply to CHARLES FORDER.]

Cambrian Railway Locomotives.

Largest and heaviest engines on this railway are the Belpaire 4-4-0 tender engines, Nos. 94 to 98 inclusive.

[Reply to "SURB."]

Locomotive Numbers.

Please read the rules at the head of these pages.

[Reply to ALEC ROBERTS.]

Canadian Pacific Railway.

Rail gauge of this railway is 4 ft. 8½ in., the same as the normal British gauge. See page 304, "Railway Year Book."

[Reply to E. G. HOUGHTON.]

Dumbarton and Balloch Joint Railway.

First Chairman of the Dumbarton and Balloch Joint Committee was the late Mr. Henry Grierson.

[Reply to J. W.]

Somerset and Dorset Joint Railway Engines

There are five 2-8-0 tender mineral engines on this railway, but no 4-6-0 locomotives.

[Reply to "SURB."]

Italian State Railways.

London offices are at 12, Waterloo Place, Regent Street, S.W.

[Reply to J. W.]

AT LONDON ROAD STATION, MANCHESTER.

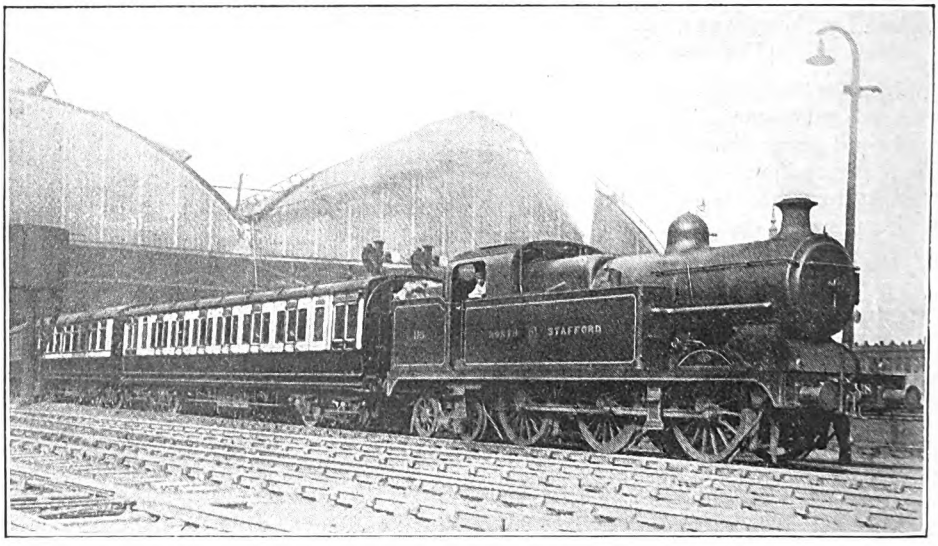

Photo.] [*W. H. Whitworth.*

12.5 P.M. LONDON EXPRESS HEADED BY NORTH STAFFORDSHIRE RAILWAY 0-6-4 TANK ENGINE, No. 118.

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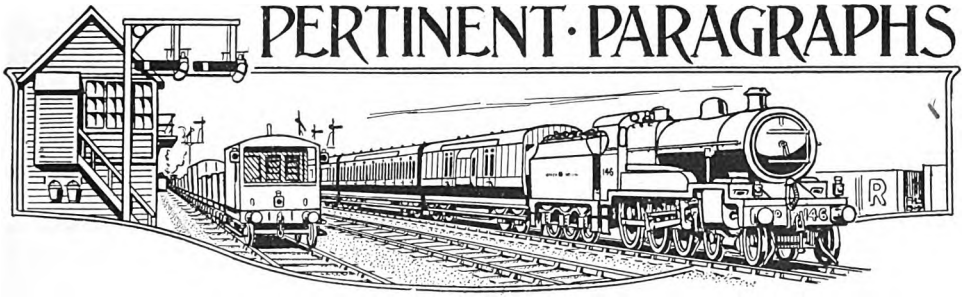
PERTINENT·PARAGRAPHS



Our Frontispiece.

To Sir Henry Fowler, Chief Mechanical Engineer, Midland Railway, the RAILWAY MAGAZINE is indebted for the photograph from which the frontispiece of this issue has been produced. The engine, No. 2933, is one of the No. 2900 class rebuilds. About three years ago it was decided that when new boilers were required they should be of the Belpaire type, and a new boiler, in accordance with present practice, was therefore designed, the external dimensions being the same as those of the boilers being replaced.

The first engine was rebuilt and put into service in July, 1917, and a further 22 engines—including No. 2933—have since been similarly dealt with. The wheels are 4 ft. 11 in. diam., and the cylinders 18 in. diam. by 26 in. stroke.

Another group of engines, viz., Nos. 3020 to 3129, are also being fitted with boilers of this class, and up to the present nine have been rebuilt. In this case the wheels are 5 ft. 3 in. diam., the cylinders 18 in. by 26 in and the working pressure 140 lb. per sq. in. when new boilers are put on old frames, or 160 lb. when frames have been renewed. Ten of these boilers are fitted with steel fireboxes.

Railway Working under National Control.

A STATEMENT showing the results of working the railways under Government control since August 5, 1914 (Great Britain) and January 1, 1917 (Ireland), has been issued by the Ministry of Transport. This should do much to clear up popular misconceptions as to the real position of the home railways, especially as the tables appended give data which enables the various factors to be properly considered; but, necessarily, certain items can only be dealt with in the form of estimates, and some of them are still in process of elucidation. For instance, while payments made by the Government to cover the guarantees of net receipts can be stated definitely, the value of "services rendered" can only be estimated, while there are other services under the heading of "other businesses" (*i.e.*, apart from conveyance by rail), which cannot be ascertained prior to April, 1919, and estimates, therefore, vary from £10,000,000 to £15,000,000. Deferred liabilities in respect of replacement of stores and materials, arrears of maintenance and abnormal wear and tear, besides other complicating factors, are also uncertain. But estimating reasonable amounts on account of Government traffic Sir Eric Geddes adopts the view that for the period, August 5, 1914, to March 31, 1919, the revenue earned from all sources exceeds expenditure and the guarantees by about £2,000,000 to £7,000,000, according as the lower or higher figure (£10,000,000 or £15,000,000) mentioned above is taken, although even then there are the heavy liabilities indicated to be set against this margin.

A War Year's Statistics.

Taking 1918 as a specimen year, when all factors concerned had reached their maxima, it may be noted that for the railways of the United Kingdom receipts from passenger train traffic were £72,715,192 (including the 50 per cent. increase in fares), from goods traffic £75,201,251, and the estimated value of Government traffic was £42,494,424, and with other items total revenue was £183,775,294, as compared with £118,700,935 in 1913. Against this, including some allowance for arrears of construction, maintenance and renewal, but not complete estimates for all the complicating factors, expenditure was £137,136,814, compared with £75,127,210 in 1913, giving a net revenue of £46,638,480 against £43,575,725 before the war.

This does not give much margin for special factors, but indicates that under the Government guarantee the railways were solvent, and that despite the enormous increases on the expenditure side, as traffic was then conducted, due payment for services rendered was substantially covered by the Government guarantee, the advantage probably

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lying with the Government. It is, however, the high earning power due to maximum train loading which really accounts for the realisation of a balance on the right side, while the post-armistice period has produced additional problems which, together with the reduction in Government traffic, have materially altered the situation. For the year ending March 31, 1920, it is estimated that public traffic will produce £157,400,000 and Government traffic only £19,200,000, against an expenditure of £173,520,000, thus providing only £3,100,000 by way of net receipts (increased to £3,400,000 by £300,000 by net receipts from "other businesses") towards the £48,400,000 required to be met by the Government guarantee of £47,400,000 and £1,000,000 interest on new capital. As a result it is assumed that the net deficit falling upon the Exchequer will be £45,000,000 Any improvement in the position is mainly due (1) to the extraordinary increase in passenger traffic last summer, and (2) to the decision to apply, from April 1, 1919, to Government traffic the same rates of increase as have been made to the public. The latter results in a credit to the railway account of about £5,000,000, but this credit involves a corresponding charge to other Government departments. Sir Eric Geddes also points out that the estimated deficit may prove to be inadequate (*a*) if the drop from the summer level of passenger receipts is more marked than usual, as may well be the case in view of the unprecedented height attained, and (*b*) as a result of the dislocation of business by labour troubles. On the other hand, no allowance is made for any growth of revenue from increases in goods rates which may become operative before the close of the financial year.

Institute of Transport.

Although only now approaching realisation an Institute of Transport has been wanted for many years; but it is launched with the full support of the Ministry of Transport, general managers of all the leading railways, and of responsible authorities concerned with other branches of transportation. It is true that the technical engineering sections of transportation are provided for by the Institutions of Civil, Mechanical, Electrical, Locomotive, Signal, Marine and Automobile Engineers, and for that reason the Institute of Transport will be concerned mainly with operating and traffic aspects as distinct from engineering; but transportation is now so vast and comprehensive that the scope of the new Institute will be very wide. And apart from its value as a training and qualifying medium, the fact that the theories and practices of transportation as a whole are to be regarded on a professional basis, and on a par with the recognised status of professions dealing with the machinery of transportation, is of the utmost importance. This development also carries the inference that transportation involves scientific study, co-ordination of methods and special qualifications, and with due acknowledgment to the work of the London School of Economics, the influence of the new Institute will raise the machinery of training for the practice of transportation to its proper level, involving, too, the correct association of theory and practice, with the added advantage of full support in the highest quarters.

Provision is made in the qualifications, as stated in the proposed rules, for the various grades of membership—member, associate member, honorary member, graduate and student—to be open to persons not directly engaged in the practice of transportation; but this is necessary to meet certain cases, and as a general statement membership is confined to those having certain qualifications, or in process of training to acquire the necessary status. Membership, according to grade, will therefore constitute a criterion of qualification, and will consequently impose a standard of training, experience and capability, which should materially assist the proper development of the "scientific railroading" which is to be a characteristic of the future. But more valuable still is the fact that the Institute will provide an authorised and qualified medium for training railway officers of the next generation; in addition, executive officers will be able to exchange views and experiences, and to discuss practical topics, under conditions apart from their official duties. The programme of operations is, in fact, a comprehensive one. The Institute undoubtedly has a wide sphere of usefulness before it.

The inaugural meeting was held on Monday, November 3, on the invitation of the Right Hon. Sir Albert Stanley, M P., when the Right Hon. Sir Eric Geddes, M.P., Minister of Transport, was invited to become the first President of the Institution, and a Provisional Committee was appointed as follows:—two members of the Ministry of Transport, Sir Sam Fay, Sir Francis Dent, Mr. H. H. Gordon, the Hon. Sir Arthur Stanley, C.B.E., Sir Maurice Fitzmaurice, Sir Joseph Broodbank, Sir W. Joynson-Hicks, Bart, M.P., and Mr. H. Dutfield. Sir Albert Stanley accepted the Chairmanship of the Committee.

New Steel Dining Cars: North British Railway.

THESE carriages, of which there are three types, composite, third-class, and semi-open first-class, are being built by Craven's Railway

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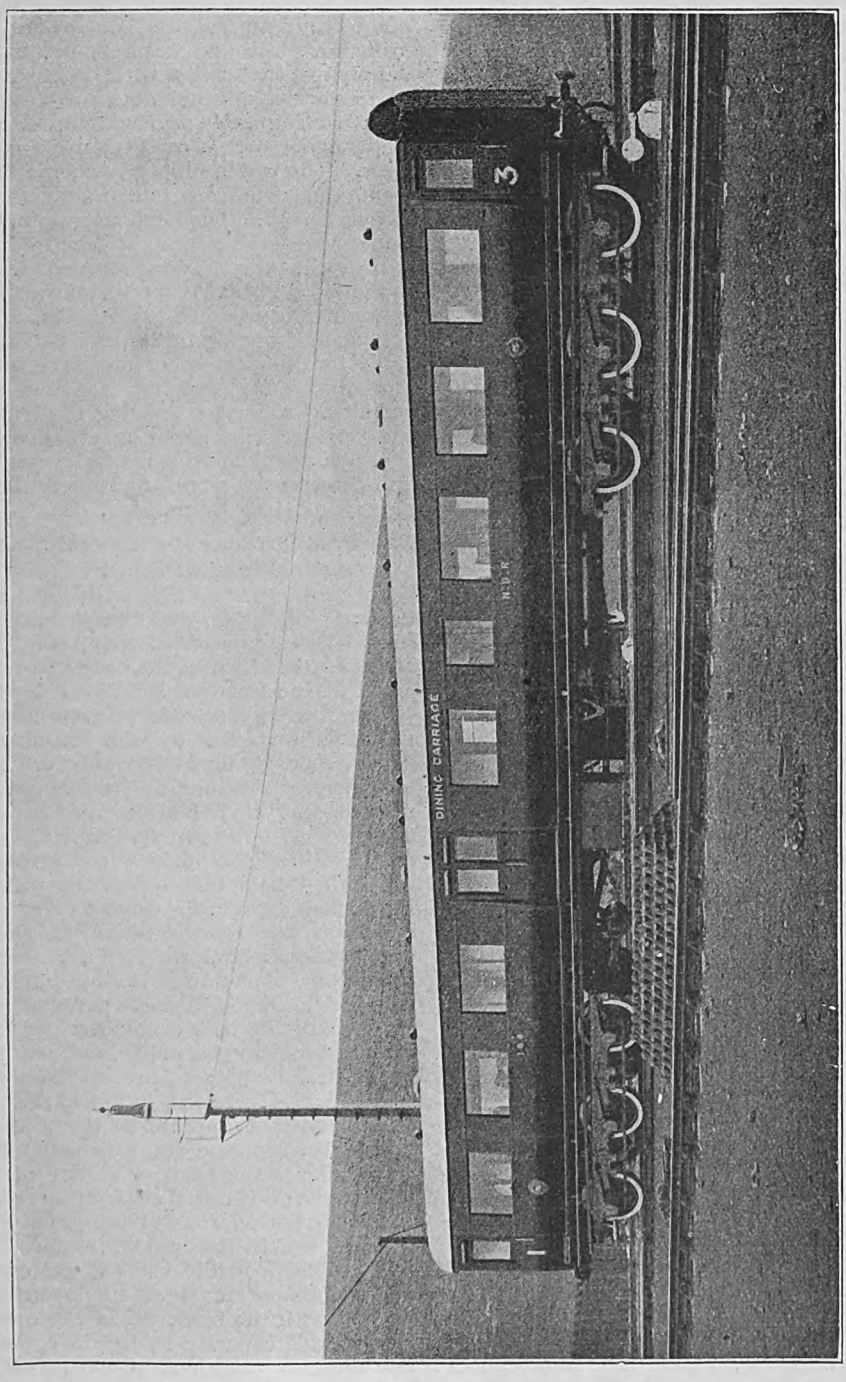

NEW STEEL DINING CAR, NORTH BRITISH RAILWAY.

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Carriage & Wagon Company, Limited, at Sheffield, to the design of Mr. W. P. Reid, Locomotive and Carriage Superintendent.

Principal dimensions are :—

Length over buffers	68 ft. 11⅞ in.
,, ,, body	66 ft. 0⅛ in.
,, ,, headstock	65 ft. 4⅛ in.
,, centre to centre of bogies ..	45 ft. 10⅛ in.
,, bogie wheelbase	12 ft.
Width outside body over mouldings	9 ft.
Height to top of roof from rail ..	12 ft. 4 in.
,, from rail to centre of buffer..	3 ft. 5¼ in.
Approximate total weight (loaded) ..	45 tons.

Cars are fitted with British standard vestibules, vapour heating in saloons and compartments, passenger communication apparatus working in conjunction with the vacuum brake, and electric lighting. Torpedo ventilators are fitted in the roof, and electric exhaust fans in the ceiling of each saloon. All external fittings are polished brass, whilst internal ones are copper oxydised and relieved.

Bodies are finished standard North British Railway lake colour with gold lines and usual lettering and numbering. The roofs are painted white and, under the gear, black.

The composite car has a first-class saloon for 20 passengers at one end and a third-class saloon for 21 passengers at the other, the kitchen and pantry being between these. In the third-class car the kitchen and pantry are at one end and the two saloons occupy the remaining floor space. The end saloon has seating accommodation for 15 passengers (non-smokers); the adjoining saloon seats 21 passengers (smokers). The semi-open first-class car is intended to run in conjunction with one of the previous types, and has no kitchen or pantry, but consists of two dining saloons, four passenger compartments and a lavatory. The end saloon has accommodation for 12 passengers (smokers), and the adjoining saloon seats 11 passengers (non-smokers). The vehicles are mounted on two six-wheeled bogies to the North British Railway standard design, of pressed steel members, and fitted with special helical bolster springs and side laminated springs, with two nests of auxiliary rubber springs. The wheels are of the rolled steel disc type.

Internal Equipment.

Frameless drop lights are fitted to all the saloon windows, operated by handles. The compartment and corridor ceilings are of ¼ in. Millboard covered with "Alhambrine," painted white. Spring blinds of olive tapestry are fitted on all the saloon windows, and above these parcel racks of neat design are fixed. Seats, which are framed and panelled in walnut, are of a theatre pattern fitted with arm rests. The dining tables are also of walnut, the tops being covered with pegamoid, and provided with green baize covers. Carpets and rugs are laid in the compartments, saloons and corridors.

The kitchen is equipped with a kitchener complete with roasting oven, hot closet, grill, hot plate and water boiler, the latter supplying the sinks with hot water. A plate warmer and movable hot closet fitted with carving table is installed, also a hot water boiler with a capacity of 80 pints per hour. The water supply to this is obtained from the overhead tanks and controlled automatically. The kitchen equipment comprises a vegetable bin, zinc-lined cupboards with meat trays and provided with ice-baskets, cupboards for chinaware, sauce racks and provisions, plate racks, a marble cold slab, chopping block, sink and a hinged table for the service of meals through the Bostwick gate opening, leading to the corridor. A service opening is arranged in the kitchen cross partition. The pantry is equipped with all the necessary cupboards and drawers for stores, utensils and napery, also a sink with drain board.

The Qualifications of a General Manager.

Contending that skilled railway operation involves qualifications of a professional character, and that "railroading" should be recognised on that basis, Mr. W. M. Acworth, M.A., in the course of a lecture given at the London School of Economics on October 23, discussed at some length the problems involved by the training of a general manager for a large railway. First he endeavoured to define what a general manager is, and his description can be accepted as substantially meeting requirements. "In the first place," said Mr. Acworth, "he stands before the public and Parliament and the Government departments as the representative of the great organisation which we call a railway. In the second place, he is the head of a great commercial undertaking, gathering in a revenue of 10 or 15 millions per annum, by supplying to the public, mainly in retail quantities, the service of transport—a service which, while to him it is mainly one and indivisible, appears to them as a vast number of separate and independent units. Lastly, he is the head of a staff of tens of thousands of persons engaged in the multifarious ramifications of the supply of the services which the public require, and is responsible for the vast stock of plant, appliances and material employed in connection with the rendering of those services. And in this capacity he has to consider, at one moment, questions of the rates of pay and conditions of service of train men, engineering, station and office staff; at another moment, whether larger engines will cost more in maintenance and increased

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permanent way expenses than they save in haulage; whether the size of wagons should be suited to existing traffic conditions or the traffic conditions should be altered to suit the wagons; or, again, whether an increase of passenger train speed will bring in, in increased receipts, more or less than it causes in increased expenditure."

"The Railway Profession."

FROM this Mr. Acworth proceeded to outline his case, that railway operation calls for professional education as do the recognised professions, but must be superimposed upon a suitable and satisfactory course of general education. He pointed out that in certain other countries the training of men for high railway positions does not commence until they have reached an age of about 20 years, until when they receive the same class of education as do those intended for other professions. He considered this to be essential, for the railway manager requires to be familiar with general history and economics, constitutional law and many other subjects, and not only with those which relate directly to railway working. And even when specialist training is commenced, the embryo general manager requires to know something about many other branchés of railway work. He must know a fair amount about law, though he may not be a lawyer; he must understand something about civil and mechanical engineering; and he must be conversant with tariff legislation and many aspects of trade and industry, international as well as home. Above all he must be familiar with the history, theory and practice affecting railway rates and charges. These and kindred topics must be the subject of special training and study, for the time has passed when a junior in a low position can hope to become general manager. It was, however, acknowledged that while capable management of men may be trained and cultivated, suitability therefor must, in large measure, be inborn. Mr. Acworth pointed out that although the solicitor, the civil engineer, and the mechanical engineer of a railway may be both railwaymen and professional men, they are not directly skilled in the railway profession; instead they are qualified in their respective professions, particularly in regard to their applications to railway work.

Mr. Acworth made out a very good case for systemising railway training on a professional basis, by which he understood railway management and traffic operation, and spoke of the services rendered by the London School of Economics in this respect, and of the proposed Institute of Transport. With substantially all of his remarks we cordially agree. At the same time it is somewhat to be regretted that he confined his attention almost exclusively to the managerial side of railway work. Suitable training is as necessary, in view of the tendencies of the day, for those who are to take higher positions below those of chief executive and traffic officers, and although we gather that Mr. Acworth wishes to infer that the same principle should apply, we should have liked to have heard his views regarding the traffic working side and training for responsibility for other than managerial positions. To reach the position of general manager can be the lot of only a very few men; but on a large railway there is room for hundreds of trained men in positions of secondary responsibility.

Sir Eric Geddes on Scientific Transportation.

PRESIDING on the occasion of Mr. Acworth's lecture above referred to the Rt. Hon. Sir Eric Geddes, G.C.B., G.B.E., M.P., Minister of Transport made some interesting comments when the lecturer had concluded. He admitted that he had himself learned more by practice than study. As a matter of fact he had been bad at study all his life. As he listened to Mr. Acworth he felt, for the first time, rather glad that under the Ministry of Transport Bill he had two years in which to consider a policy to deal with the problem. If he had had a policy, and made it known, Mr. Acworth, with his knowledge of railway work, would have cut it to pieces!

"As to transportation, they had three milestones which they were passing. One was the great stride in scientific education which was being made at the London School of Economics; another was the recognition which, throughout his working life he had hoped for, and which he thought had now been given to transportation, for, until recent years, what transportation meant to a civilised community had never been realised; and the third milestone was that there was a new Ministry specially changed with transportation, and nothing but transportation, in this country."

Sir Eric Geddes accepted Mr. Acworth's claims for railway operation to be regarded as a profession; but unlike all the learned professions, there had been a great deficiency in scientific railway education. But one must have practical experience as well as scientific education. "In the days before the war, and when he was in the management of railways, he used to say that to get a good railway officer for the headquarters staff one must get a man who was generally well educated, technically well educated, theoretically well educated and practically well educated. One should have a nodding acquaintance with what went on with most

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of the practical grades. One should know something about the theory and practice of engineering, and of traffic working; otherwise when one got to the hard problem of railway working they would find they were at the mercy of, and in the hands of, the railway experts."

Great Britain the "Mother of Railways."

"Mr. Acworth had suggested," continued Sir Eric Geddes, "that this country was behind others in the study of transportation. He agreed with that opinion. But why was that? He considered there were two reasons for that—one was temperamental, and the other was that we were the mother of railroads, and the transportation of the country had had to take on its back all the original faults and errors made in the early days. That had handicapped them, and it had prevented them seeing the wider sphere of transportation. Let them inquire as to how railways got their managers in the past.

"In the old days when the railways were steel turnpikes it was a distinguished soldier who was made manager of the line—he knew of several of them; or it was one of the sons of a gentleman of the county through which the line passed. In the same way the secretary was appointed. Then, later on, the managers were entirely civil engineers. Why was that? The management of the line had become more technical; but it became more technical from an engineering standpoint. The distinguished soldier—possibly not a very distinguished soldier—or the county gentleman, had found that they could not undertake the big engineering and business problems of a system which was spreading its tentacles throughout the world. So it was found that engineers came in who had technical knowledge of the difficult part of railway management, and later on lawyers and mechanical engineers; and within his own experience, of 20 or 25 years, he thought there had been an increasing tendency, not only here but in other parts of the world, to appoint a man less for his engineering qualifications and training but more for his personal qualifications and breadth of view and his general knowledge of the political and industrial life of the country, and his general knowledge of the law and the usages of the country in which the railway operated. It would be found, if they looked through the names of managers of railways and of members of headquarters staffs that, gradually, engineers had been replaced by traffic men and lawyers, and people of a variety of different callings had come in and replaced the engineer. He thought the reason for that was one which was perfectly plain."

Traffic Working the Initiative to Transport.

"Traffic working was the initiative to transport working in its more general term, and men who all their lives had been engaged in one particular department of traffic had not been trained sufficiently intensively, either in a school such as the one in which they were assembled that evening, or in practical work out on the line. They had come in young and had remained in the one position they at first occupied. There had been few opportunities for study, and the result had been that the general business state of the railways had not been able to supply properly qualified men, and they had had to go outside. That had been the case for a great many years. But if a scientific training were afforded, and advantage taken of it, he was convinced it would redound enormously to the benefit of railway working and also to the advantage of those who studied the position. Mr. Acworth had given them that evening the definition of a profession, and he agreed that railway management, scientific transportation, was a profession, but it must not be taken that that meant merely slavishly following railroads. If they looked at transportation merely from the point of view of a broad-gauge railway they would be making a mistake. They must look at movement as a whole. Possibly roads might be the right method of moving a particular commodity in particular quantities, under particular circumstances; but he thought it was a mistake—and he would urge all students of transportation to look upon it as a mistake—to consider it simply as a railway problem, otherwise money and time would be wasted and they would not get the most economic value for what they spent."

In conclusion, referring to his work in France during the war, the Minister of Transport pointed out that this country earned a great name among all the belligerents, including the Germans, for its ability to run the railway movement generally in France, and he felt sure that this pre-eminence which they attained in transportation in France would be reflected in their peace-time efforts. He felt sure that by the scientific development of transportation as a whole this country would, in the future, as Mr. Acworth had hoped, again become the Mecca of all those who wished to learn at the shrine of transportation as to how they could best order their activities. In that result, in bringing this country forward, he felt sure that the London School of Economics would play a very important and highly creditable part, and he had great

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pleasure in wishing the school the greatest possible success, and congratulating them upon the departure that had been made.

The Great Silence.

ON Tuesday, November 11, for a period of two minutes, every railway train in the United Kingdom, and largely throughout the whole of the British Empire, ceased running, as one indication of national recognition of those who had made the "great sacrifice" during the active hostilities which concluded at 11 a.m. on November 11, 1918. Somewhat similar measures were adopted on the occasions of the funeral ceremonies of Queen Victoria and King Edward VII., but the "great silence" was much more general, and had far greater meaning to the hundreds of thousands of families who had lost one or more of their loved ones, not a few recruited from the railway service, and in many cases engaged in working the railways which had so much to do with the satisfactory conclusion of the war. On the first anniversary of Armistice Day trains in progress came to a standstill, or delayed departure, and many a touching sight was witnessed in railway trains and at stations, the remembrance of which will not soon pass from the memories of those who witnessed or participated in them.

Many railways organised special services of remembrance. At Paddington Station, Great Western Railway, just before 11 a.m., the stationmaster, Mr. Henry Weaver, accompanied by members of the staff numbering close on 200, placed a beautiful wreath on the station Roll of Honour, with a card on which was inscribed: "To our fallen comrades, from Paddington Station platform staff."

In the Great Hall at Euston, London & North Western Railway, a memorial service took place, over which Sir Gilbert Claughton, the Chairman of the company, presided. The hall was crowded with members of the public and employees of the company. The King's letter was read and two trumpeters sounded the "Last Post." "Fight the Good Fight" was sung, and after the National Anthem there was a moment more of unbroken silence, and the assembly slowly filed away. A large wreath, subscribed for by "the chairman directors and employees of the London and North Western Railway, in memory of the Glorious Dead," hung with a Union Jack in front of the dais.

There were unforgettable scenes at the great railway works at Crewe. Promptly at 11 o'clock all the machinery at the London and North Western Railway works were stopped. At attention 9,000 men stood bareheaded, paying silent tribute to their many comrades who gave their lives in the war. One of the most impressive scenes was a gathering of 50 veteran railwaymen who assembled at their institute and sang the Doxology.

The Earl of Bessborough, Chairman of the London, Brighton and South Coast Railway, arranged for all the available railway staff at London Bridge to meet at 10.55 in the company's meeting room. His lordship delivered an appropriate address. Then, at the conclusion of the period of silence one verse of the hymn, "O God, our help in ages past," was sung, followed by the National Anthem. Lord Bessborough concluded the meeting by saying: "May I say one word before we separate—that I hope the younger men will have long and happy lives, and will frequently celebrate this unique and great occasion."

Mechanical Coaling Plant at Carlisle, London and North Western Railway.

BY the courtesy of Mr. C. J. Bowen Cooke, C.B.E., Chief Mechanical Engineer, London and North Western Railway, we are able to illustrate on the next page the coaling plant at the London and North Western Railway engine sheds at Carlisle. Prior to its being put down the coaling of engines was done entirely by hand by a large gang of men. The machine is operated by four men only, and its use exemplifies the chief advantage claimed for mechanical coaling, namely, the rapidity with which locomotive tenders can be replenished.

The top centre of the elevator is 25 ft. above, and the lower centre 19 ft. 6 in. below rail level. There are in all 56 buckets, with a capacity of one-third of a ton each, and the speed of the belt is 28 ft. per min. The belt is driven by a 20-h.p. electric motor, 400 volts, 50-cycle, 3-phase, and the hopper is of 20 tons capacity, with the object, if necessary, of mixing two qualities of coal. Wagons supplying coal to this plant have either end or bottom doors. In the case of the end door type, the wagons are tipped by means of an hydraulic tipper, which has a ram of 6 in. diam. This is fitted with a crutch at the end which embraces one of the axles of the wagon. The wagons with bottom doors are placed immediately over the hopper, and the doors opened for the discharge of coal.

War Work on the Great Central Railway.

SERVING a wide extent of country, the Great Central was already so complete that the only addition which required to be made for the purposes of main line traffic in the interests of the war was a new link about 700 yards in length, between Whetstone, a few miles south of Leicester, and Blaby on the London and North

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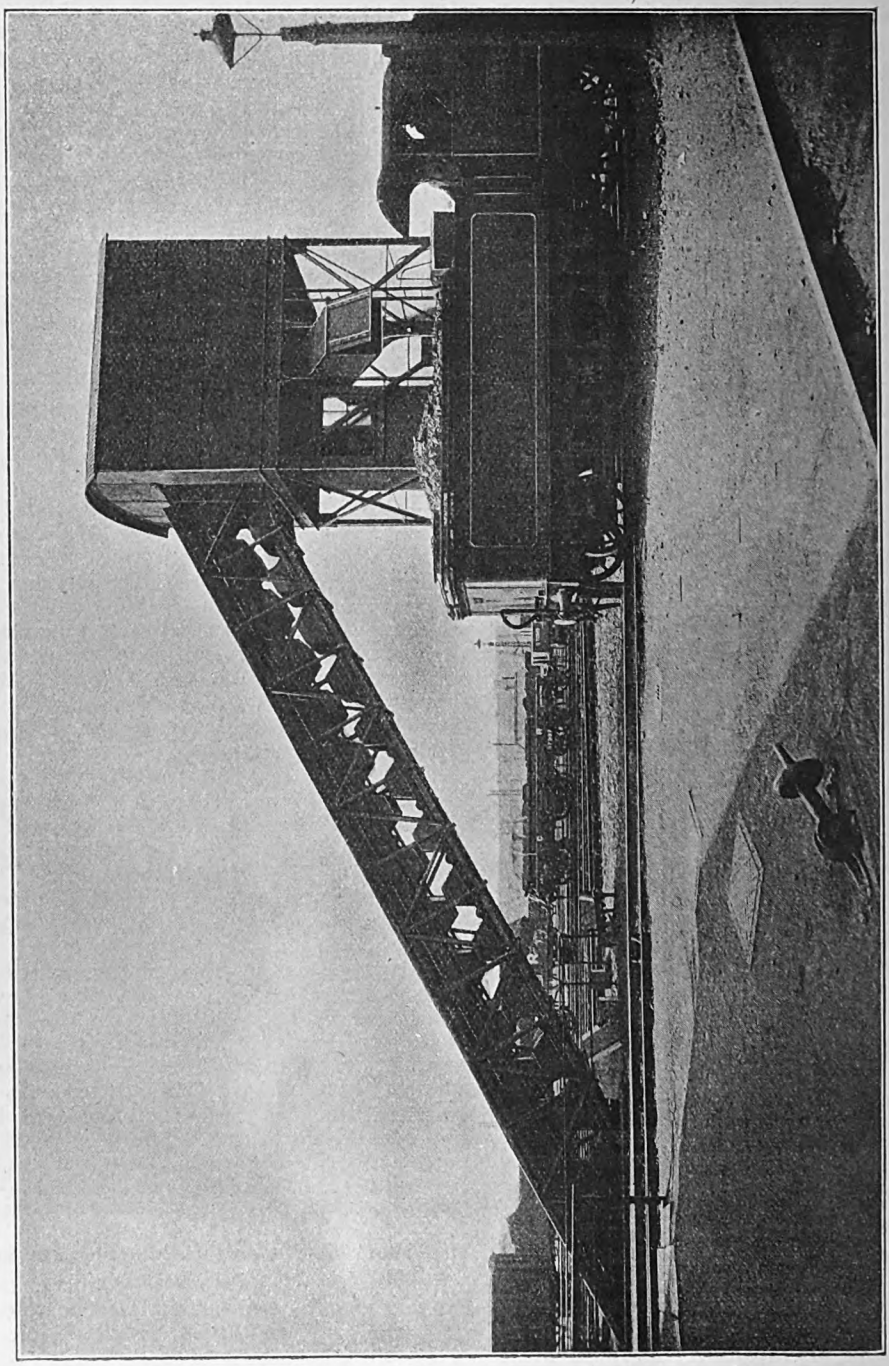

MECHANICAL COALING STAGE, CARLISLE: LONDON & NORTH WESTERN RAILWAY.
Belt-Conveyor used for Hoisting Buckets.

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Western line from Nuneaton to Wigston Junction, thus providing connection also with the Midland system. In addition, the Great Central Railway put in a local connection with the Clipstone colliery branch of the Mansfield Railway for the Clipstone Camp Railway, constructed by the War Department. Permanent way and signalling of the camp railway were maintained by the Great Central; a platform was erected at the camp for the entraining and detraining of troops, horses, stores, &c., and a passenger train service was instituted between the camp and Mansfield. Other camps which brought a good deal of traffic to the Great Central lines were situated at Wendover, Northolt, Ruislip, Denham, High Wycombe, Worksop, Brocklesby, Stallingboro', Cleethorpes, Immingham Dock and Barton-on-Humber. Halts and sidings were constructed at various points to facilitate the movement either of military or of workmen in Government employ.

It was, however, in connection with the great industrial establishments served by the Great Central that extra siding accommodation was more especially provided on account of the greatly increased output due to the execution of so much Government work. Almost all the important Sheffield firms required an increase in their siding facilities, and this was the case in many of the other industrial districts served, while the congested condition of the industrial area in and around Sheffield led to other neighbourhoods being chosen for the additional works which some of the armament firms found indispensable.

Traffic Statistics.

TRAFFIC carried over the Great Central Railway during the period from the outbreak of the war to March 31, 1919, included the following: — Officers, 54,862; men, 2,601,865; horses in boxes, 5,368; horses in cattle trucks, 115,431; guns and limbers, 896; four-wheeled vehicles, 7,333; two-wheeled vehicles, 3,150; baggage, 28,051 tons; tanks, 401; big guns, 163. For the transport of this traffic during the period stated the running of 5,663 special trains was necessary. The figures given in respect to officers and men are exclusive of a large number on leave or on furlough who were conveyed by ordinary passenger train services, but they include 6,703 officers and 188,318 men belonging to the American troops. Of ambulance trains dealt with on the Great Central during the same period, 399 carried through traffic, 35 carried traffic originating on the Great Central system, and 131 unloaded sick and wounded on that system.

Goods and coal traffic forwarded on behalf of the Government from Great Central stations during the period from August 5, 1914, to December 31, 1918, amounted to 1,356,950 tons of general merchandise and 182,160 tons of coal and coke.

Train service curtailments in May, 1918, led to a reduction of 40 per cent. as compared with 1913, but traffic conveyed, after a set back of short duration, assumed greater proportions than ever. In 1918, it is estimated that 33,793,633 passengers were conveyed under ordinary and season ticket bookings. Large quantities of Admiralty coal were carried on the Great Central, as many as nine special trains running from South Wales to Immingham on a single day. Altogether the number of special trains with Admiralty coal dealt with by the company between the outbreak of war and March 31, 1919, was no fewer than 1,930. Traffic to and from the port of Grimsby was less than in pre-war days; but this decrease did not reduce the transportation difficulties to any great extent, as coal from the Yorkshire, Derbyshire and Nottingham coalfields was diverted to Western ports for use by liners and other vessels engaged on transport work, while the Great Central Railway shared in the conveyance of coal from Durham and Northumberland coalfields to London. In 1918, general goods traffic amounted to 8,882,539 tons and coal to 17,861,681 tons.

Overseas and Naval Assistance.

ENGINES and wagons sent to France by the British railway companies, included 18 0-6-0 and 15 0-8-0 Great Central engines, together with six new engines built in the company's works at Gorton. The company assisted, also, in the provision of material for the repair of Belgian locomotives. No fewer than 2,767 Great Central 10-ton wagons and 500 covered wagons were despatched to France, while 35 brake vans were supplied for the use of the forces in Egypt.

Apart from special advantages in the transport of naval and military traffic due to the geographical situation of the Great Central system, the Government gained benefits to an almost incalculable extent in the prosecution of the war by taking over the Great Central Railway docks at Grimsby and Immingham, the former being converted into a base for the Royal Naval Reserve Trawler or Mine-Sweeping Section, and the latter into a submarine and torpedo-craft base.

The coaling facilities at Immingham were largely used by the Navy, especially during the early stages of the war. From 2,000 to 4,000 wagons of Welsh coal were generally kept on sidings in the dock area ready for immediate shipment. As a further reserve,

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in case of emergency, a site was allocated at Immingham where supplies of Welsh coal could be stacked. As many as 35,000 tons were stored there at one time. The total quantity thus held in reserve at different periods amounted to 122,252 tons, of which nearly 108,000 tons were reloaded and shipped or otherwise disposed of. At Grimsby 7,775 tons were stacked under like conditions. When, also, the demand for tonnage became acute and there was great need to save as many steamers as possible, the French Government arranged to send luggers in tow to England for the coal then being supplied to France, and Immingham and Grimsby were selected as the ports of shipment for this traffic. On Admiralty account 13,392 vessels were thus loaded, representing a total of 2,113,544 tons of coal shipped.

Marine and General Services.

THE Marine Department of the Great Central Railway rendered excellent service to the Government during the war. In 1914, the company carried on their Continental trade with a fleet of 15 passenger and cargo steamers. The *City of Leeds*, *City of Bradford* and *Bury*, being at Hamburg when war broke out, were seized by the Germans, and held by them until the signing of the armistice. The remaining 12 passenger steamers were requisitioned by the Government, and used as store or munition carriers at Scapa Flow or in the Mediterranean, as well as for transporting supplies to France. Four were lost while in Government service, namely, the *Leicester*, mined in the Channel, February 12, 1916: the *Chesterfield*, mined in the Mediterranean, May 18, 1918; the *Immingham*, sunk by collision in Lemnos Bay, June 12, 1918, and the *Wrexham*, wrecked in the White Sea, June 18, 1918. These disasters involved the loss of 22 lives, namely, one officer, two engineers, 15 seamen, two naval ratings, and two passengers. The small craft owned by the company also contributed considerably to the national effort.

In regard to other matters it may be mentioned that the Great Central goods warehouse at Marylebone was utilised by the Royal Army Clothing Department as a store, four of the floors being placed at their disposal. A considerable portion of the goods yard at Leicester was used for dismantling "tanks," &c., returned from overseas, and at various periods accommodation for the storage of foodstuffs, &c., was given in the warehouses at Wakefield, Lincoln, Sheffield and Manchester. Valuable assistance was also given by the company in the manufacture of munitions of war. For this purpose 432 women and girls were employed, the work on which they were engaged, including the turning of shells, nose pieces and base plates, screwing and milling operations, painting and labouring.

A beginning was made with the erection of hydraulic hay presses at Grimsby in June, 1918. By the time the armistice was signed 20 had been completed and were at work. During this period of five months 29,238 tons were pressed, while the total shipments of hay and straw from the two ports amounted to 145,615 tons, namely, Immingham, 46,467 tons, and Grimsby, 96,968 tons.

An Alternative to the Gattie Scheme.

IN view of public interest in the proceedings before the Select Committee appointed by the Board of Trade to inquire into the scheme for a proposed central goods clearing house, with which the name of Mr. A. W. Gattie, of the New Transport Company, Limited, is associated, our contemporary the *Railway Gazette* recently published an article describing an alternative scheme which has many points of interest. Incidentally it appears to accord much more closely with practical possibilities and has the additional advantage that it does not require the trader or manufacturer to introduce new equipment or change his methods. In fact, it is largely the logical outcome of the super-imposition of changes produced by war necessities upon pre-war conditions and methods.

In brief, the proposal is to divide the Greater London area into a number of zones or districts, each based on one or more of the existing goods depôts to and from which all of the traffic appertaining to the particular area would flow. Where depôts are closely adjacent it might be found expedient to combine two or more, using one for inwards and the other for outwards traffic or otherwise varying the arrangements as may be found expedient. Outlying and smaller depôts would, to some extent, become subsidiary to the principal depôts, as it would be desirable to concentrate the traffic, except that passing in full truck loads, on the chief depôts so as to secure the best possible loading of wagons and trains. Wagons with through loads from the smaller depôts would, of course, travel direct to concentration or marshalling yards, where outgoing traffic would be collected to be formed into train loads.

From the point of view of road transport this scheme should meet all requirements as it reduces to the *minimum* the number of railway-owned vehicles traversing the roads of each area for the purpose of delivering or collecting traffic. Privately-owned vehicles also would, of course, have to conform with the principles of the scheme. It is not likely that traders would raise any

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objection, as their merchandise inwards and outwards would be dealt with at one particular depôt, and that the nearest to their place of business, this being an essential point of the proposed system.

Goods Depôts as Centres for All Traffic.

The principal objection would be that each depôt would have to collect and deliver in its particular area as well as load and unload on its decks, &c., traffic for places all over the country, whereas the bulk of the goods are now sent by road direct from the starting point to the appropriate depôt for the railway route to be traversed. That appears to be exactly where the London traffic problem lies, namely, whether it is possible to reduce the road traffic. This could be done by limiting the road conveyance of goods to and from certain areas to particular depôts at the cost of transferring the traffic by rail from one London depôt to another, in order to reach the proper line of route to the actual destination.

In order to minimise transfer of traffic from one depôt to another, due advantage would, of course, be taken of alternative routes where such are available and of economic advantage. For example, traffic collected in the Paddington area for places on the London and South Western line west of Exeter would be conveyed by the Great Western route to Exeter or Plymouth; similarly, traffic to Birmingham or other places where the Great Western route is little or no longer than another company's would be conveyed direct and transferred to the terminal company at some convenient junction *en route* so as to minimise the transfer between the London depôts.

To give the fullest possible effect to such a scheme as that described it would be desirable to carry out in its entirety the system of allocating traffic in the various towns to the most appropriate companies, *i.e.*, those with the most direct or most convenient route, subject to the considerations mentioned in the preceding paragraph. This would be carrying out to its logical conclusion one of the arrangements adopted during the war for the more economical and satisfactory handling of goods traffic, and a system that must sooner or later be urged to completion by the Ministry of Transport.

Locomotive Performance in India.

In many respects locomotive performance in India is as notable as that in this country, and interesting records of runs with one of the Poona Race Specials of the Great Indian Peninsula Railway, supplied by a reader since 1900, Mr. B. D. Sullock, now of Bombay, may be referred to. The logs were taken between Bombay and Karjat, at the foot of the Ghauts. Gradients of 1 in 200 are met with between Kalyan Junction and Karjat. At Karjat, for the climb up the Ghauts, two 0-8-4 or 2-8-4 tanks are provided, one at the rear and one at the head. Near the top is a reversing station. Between Lonavla and Poona (40 miles) a 4-6-0 of the 221 class (D/1) is provided, but the running is not so fast on that section, as the permanent way is mostly only 70 or 80 lb. per yard. On the down journey over the Ghaut section (up to Bombay) the two tank engines are placed at the head of the train so as to secure the maximum of braking power.

10.20 A.M. "POONA RACE SPECIAL" AS BETWEEN BOMBAY AND KARJAT.

Miles.	Stations.	Booked Time.	September, 1918.	September, 1919.
		Minutes.		
—	Bombay	0 Dep. ..	0	0
9	Kurla	13 pass	—	15 38
20¾	Thana	25 ,, ...	—	29 8*
26¼	Diva	38 ,, ...	—	37 58*
33¼	Kalyan J.	46 ,, ...	42	47 3
42	Badlapur	57 ,, ...	54	58 45
53½	Neral	71 ,, ...	—	71 37
62	Karjat	82 arr.	78	81 40

1918 Run.—Engine No. 438, 4-6-0 type superheater (Vulcan Foundry Company, 1915).
1919 Run.—Engine No. 433, 4-6-0 type superheater (Vulcan Foundry Company, 1915).
(Two cylinders 20½ in. by 26 in.)
Load in both cases, 6-8 and 2-12 = 300 tons.

* In 1919 the fast line through the new Parsik Tunnel has been closed owing to a fall in the roof. This means running on the slow lines between Thana and Diva, adding 4 minutes to the running time and about 1 mile in distance, as the slow line runs round a hill which the fast line cuts through. Severe slacks are also in force at both Thana and Diva.

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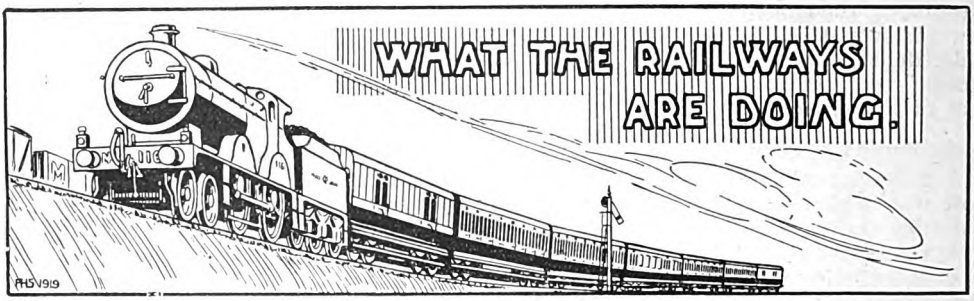

By the sudden death in a railway train of Sir Joseph Lawrence, Bart., there has passed away one of the pioneers of the Manchester Ship Canal. Born in September, 1848, and educated at Owens College, Manchester, he spent most of his early years in that city, where he had a position in the Secretary's Office of the Manchester, Sheffield and Lincolnshire (now the Great Central) Railway. Sir Joseph was well known in the printing world as Chairman of the Linotype and Machinery Company, Limited. He had many large commercial interests. While Sheriff of London, he was elected to Parliament for Monmouth Boroughs in May, 1901, and represented the constituency down to 1906. He took an active part in carrying the Patents Acts of 1902 and 1907. Knighted in 1902, he was created a baronet in 1918. In his early days Sir Joseph was for 15 years in the railway service, but his principal contribution to the transport facilities of the country was his share in the promotion of the Parliamentary Bill for the construction of the Manchester Ship Canal. Here he found an outlet for his remarkable energy.

Elliott] *[& Fry.*

THE LATE SIR JOSEPH LAWRENCE, 1848–1919.

Pioneer of the Manchester Ship Canal.

In 1872 the Trustees of the Duke of Bridgewater's Canals and Docks were anxious to sell their property. The late Mr. Fereday Smith, then the manager of the Duke's properties, approached Sir Edward Watkin, M.P., Chairman of what is now the Great Central Railway, with a view to a sale and purchase. Sir Joseph, or Mr. Lawrence as then he was, was at that time serving under Sir Edward Watkin. There was in those days an outcry in Parliament and elsewhere against the policy of the continued absorption of canals by railway companies, and a Joint Select Committee of the House of Lords and Commons sat upon the subject in 1872. Instead, therefore, of an Act of Parliament (of which notice had been given) being introduced to enable the Bridgewater Canals to be bought direct by the railway companies, Sir Edward Watkin and Mr. W. P. Price, M.P. (Chairman of the Midland Railway), jointly decided to accomplish the same purpose by buying the Bridgewater Canals, and turning them into a limited company. The canals were accordingly purchased on July 3, 1872.

Ten years later, whilst abroad on railway matters, Mr. Lawrence received a communication from the late Mr. Richard Peacock (of the firm of Beyer & Peacock, locomotive builders), who became the Deputy Chairman of the Provisional Committee of the Manchester Ship Canal. Mr. Peacock had known him for a number of years, he having served his time on the same railway on which Mr. Lawrence commenced his business career. Both Mr. Peacock and Mr. Adamson also knew that Mr. Lawrence had, in 1880, carried through Parliament, in conjunction with Colonel (afterwards Sir) Gerard Smith, an Act for uniting the Yorkshire coalfields with the port of Hull, and including the construction of docks. The share capital for that work, £3,000,000, had been subscribed three or four times over in the

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course of four or five days. On account of these circumstances Mr. Peacock and Mr. Adamson were anxious that Mr. Lawrence should become associated with their movement for obtaining the Bill for the ship canal, and the capital for its construction. Mr. Adamson also was an old railwayman, having in his youth served his time in the Durham locomotive shops of the North Eastern Railway. Mr Lawrence accepted the invitation and soon was in the very vortex of the movement in conjunction wth the Provisional Committee. In the first session when the Bill was thrown out by the Parliamentary Committee Mr. Lawrence, before going to bed, wrote some 50 or 60 letters to prominent men in Lancashire and elsewhere, urging that a second attempt should be made to obtain the Bill. Among the first replies he received was one from Mr. Jacob Bright, enclosing £500 towards starting the second list.

The late Sir Joseph Lawrence was likewise the means of bringing M. Ferdinand de Lesseps to Manchester, and his addressing a great meeting of several thousands of people in the Free Trade Hall. It would occupy too much space to dwell upon the share that he had in enlisting the support of Chambers of Commerce and municipal corporations or local boards, and in getting merchants, manufacturers and shipowners to give evidence in favour of the Manchester Ship Canal Bill, and in sifting and analysing both the quantity and quality of the facts which they were to lay before Parliament as evidence. Sir Joseph Lawrence was one of the founders of THE RAILWAY MAGAZINE, and retained a great interest in railway matters throughout his life.

* * *

SIR JOHN A. F. ASPINALL has resigned his position as a director of the Lancashire and Yorkshire Railway Company consequent upon his appointment as Consulting Mechanical Engineer in the Ministry of Transport. Sir John Aspinall was appointed Chief Mechanical Engineer of the Lancashire and Yorkshire Railway in 1886, and in 1899 succeeded the late Mr. J H. Stafford as General Manager. On his retirement from that position in February, 1919, he accepted the invitation of the directors to join the Board from which position he now resigns.

* * *

MAJOR J. H. SMEDDLE, T.D., Divisional Locomotive Superintendent, York, has been appointed "Running Superintendent"—a new position so far as the North Eastern Railway is concerned. Major Smeddle was appointed in 1894 to the position of District Locomotive Foreman at Sunderland, and, in 1898, was transferred to Darlington as District Locomotive Superintendent, and in 1906, was appointed to Divisional Superintendent at York At the outbreak of war he was called to the colours as a Territorial, and in April, 1915, went to France with his regiment—the 8th Durham Light Infantry. On Sir Vincent Raven's appointment as Acting Chief Superintendent of the Royal Ordnance Factories, Woolwich, Major Smeddle was recalled to his railway duties to assist Mr. A. C. Stamer who was then

MAJOR J. H. SMEDDLE, T.D.,
Running Superintendent,
North Eastern Railway.

Acting Chief Mechanical Engineer. In his capacity as Running Superintendent, Major Smeddle will be responsible, under Sir Vincent Raven, K.B.E., Chief Mechanical Engineer, North Eastern Railway, for the entire locomotive running arrangements on the North Eastern Railway, with an office at Headquarters of the C.M.E. Department, and will have under him Divisional Locomotive Superintendents at Gateshead and York.

* * *

IN a letter addressed to the Right Hon. H. Pike Pease by Lord Knaresborough, Chairman of the North Eastern Railway, in regard to the company's pensioners, the writer says the Board realise "the hardship which the high cost of living inflicts on all persons with fixed incomes, including, of course, many of the company's own shareholders, and there can be few, if any, who are

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harder hit than railway pensioners. The matter is, however, not entirely, or even mainly, one for the company, because so long as the railways are under Government control, any addition to the working expenses of the railway falls on the Government, and so far the Government has not authorised railway companies to give anything in the nature of the war bonus to their pensioners. In these circumstances, all the directors have seen their way to do has been to vote sums out of the company's own funds for supplementing pensions . . . but in the case of the superannuation final annuitants the staff themselves, by means of a scheme of voluntary contributions to a fund raised by weekly or monthly deduction from salaries or wages, are making a further effort to alleviate cases of hardship, and to this fund the directors have agreed to make a substantial addition per annum—£4,000."

* * *

MR. ALFRED EYDEN,
District Goods Manager,
London & North Western Railway,
Northampton.

MR. ALFRED EYDEN, who has been Acting Manager at Northampton since the death of the late District Manager, Mr. R. S. Skillington in June, 1917, has now been appointed the London and North Western Railway's District Goods Manager at that place in succession to Mr. E. H. Davies, who, since his appointment, has been attached to the Coal Controller's Department, and has now taken up important duties at Headquarters. Mr. Eyden entered the London and North Western service at Rugby, where he was stationed for many years, filling various positions, and was transferred to Northampton on the outbreak of war. He is much interested in superannuation matters and other questions affecting the staff, and the appointment is a very popular one.

* * *

WITH deep regret we record the death of Mr. Harry Cuff Smart, Secretary to the British Railway Clearing House. Mr. Cuff Smart, who was 54 years of age, was a son of the late Mr. Harry Smart, who was Secretary to the Clearing House from 1890 to 1907.

THE LATE MR. HARRY CUFF SMART,
Secretary,
Railway Clearing House, 1911-19.

Prior to Mr. Cuff Smart's appointment in 1911 he acted as Secretary for many years of the Metropolitan, Imported Goods and Mineral Managers' Conferences. He represented the Railway Clearing House at the International Railway Congress at Washington in 1905 and at Berne in 1910.

* * *

THE Empire Roller Bearings Co., Ltd., having placed their services at the disposal of the Ministry of Munitions and suspended their ordinary business during the War, has now resumed active operations at No. 13, Victoria Street, Westminster, and will in future be closely associated with Ransomes & Rapier of Ipswich and London, of which

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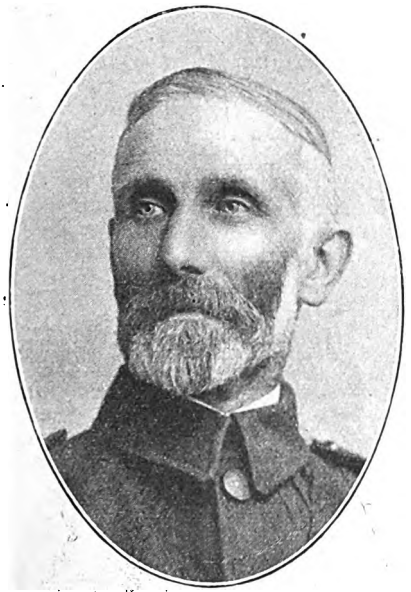
Sir Wilfred Stokes, K.B.E., is the Chairman. Mr. Thomas W. How, M.I.Mech.E., who has conducted the Empire Roller Bearings Co.'s business as Managing Director since it was established in 1901, will continue in that position and will be assisted by former members of his staff now demobilised.



MR. GEORGE E. SMYTH,
Traffic Manager,
Great Southern & Western Railway, Ireland.

By the board of the Great Southern & Western Railway, Ireland, Mr. George Edward Smyth has been appointed Traffic Manager of the company. Mr. Smyth has been Superintendent of the Line since 1911, prior to which date he was Chief Assistant to the Goods Manager and Traffic Manager. As Traffic Manager Mr. Smyth succeeds Mr. Percy Wharton, late of the Lancashire and Yorkshire Railway, who has been appointed to an important position in the Irish branch of the Ministry of Transport. Mr. Smyth is a familiar figure at Clearing House meetings in London, and represents the Irish railways generally on the Special Rules and Regulations Committee. He is also a member of the Managing Committee of the Railway Benevolent Fund Institution.

* * *

Mr. H. E. Blain, Operating Manager, London Underground Railways and London General Omnibus Co., Ltd., presided at the first of the fifth series of Efficiency Meetings recently held at the L.G.O.C. Training School, Chelsea. The paper for the evening "Railway and Omnibus Camera Studies," read by Capt. A. Rozier, General Superintendent, L.G.O.C., was exceedingly interesting, and was composed of descriptions of the places and objects of interest on several of the omnibus country routes, illustrated by cinematograph films and lantern slides. Special films were shown of the manufacture of electric locomotives as carried out by the General Electric Company at Schenectady, U.S.A., preceded by illustrations of various forms of traction, both past and present. A trip over the "Bakerloo" extension from Queen's Park to Watford was picturised, as also were some "Dont's" for omnibus staff, and the Farewell Meeting and Parade of the L.G.O.C. Special Constabulary on Empire Day, May 24, 1919. A vote of thanks was accorded the reader by Mr. J. F. Bradford, Assistant Superintendent (Southern Division), London and North Western Railway, seconded by Mr. W. M. Ballinghall, Accountant to the Metropolitan Railway.

* * *

The Irish Railway Clearing House Committee has appointed Mr. P. J. Brennan to the position of Secretary of the Irish Railway Clearing House from November 1, 1919.

MR. PETER J. BRENNAN,
Secretary of the
Irish Railway Clearing House.

At a recent meeting of the Irish Managers' Conference, held in the Irish Railway Clearing House, Mr. J. R. Kerr, General Manager, Cork, Bandon and South Coast Railway, was unanimously elected Chairman of the Con-

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ference for the year 1920. Mr. Ingram having intimated that he had resigned the position of Secretary of the Irish Railway Clearing House to accept the appointment of Secretary, Ministry of Transport (Ireland), the following resolution was passed:—"The members of the Conference unanimously agreed to place on record their appreciation of the ability and courtesy displayed and helpfulness rendered by Mr. Ingram in the discharge of his duties during the period of his Secretaryship. While regretting his departure from the Clearing House, they congratulate him upon his present preferment."

Elliott] [*& Fry.*

MR. HOWARD WILLIAMS, C.B.E.,

Assistant General Manager,
London & North Western Railway.

Mr. Howard Williams, C.B.E., Assistant General Manager, London and North Western Railway, who accompanied the British labour delegation to the International Labour Conference at Washington, was chosen by the Railway Executive Committee to act in an advisory capacity to the employers' delegate, Mr. D. S. Marjoribanks. Mr. Howard Williams, who entered the service of the London and North Western Railway in 1897, has held the position of Assistant Goods Manager at Wolverhampton and Liverpool, and in 1913 was transferred to Euston to take charge of the Conciliation Department. In 1915, he was appointed Mineral Traffic Manager, whilst, during the war, he held the post of Director of Inland Transport, Ministry of Munitions. He was appointed to the position of Assistant General Manager early in the present year.

* * *

MR. A. LAMB, O.B.E., who five years ago was made an Assistant to the Superintendent of the Line, Great Northern Railway, has now been appointed Assistant Superintendent of the Line. Mr. Lamb entered the Great Northern Railway service in 1891, and after experience in various capacities in the provinces, joined the staff of the Superintendent of the Line at King's Cross in 1897, subsequently being attached to the District Superintendent's Outdoor Staff at King's Cross. In 1906 he returned to the Superintendent's Office to take charge of the Excursion Section, and a few years later was appointed Chief of the Special Traffic Section which position he held until 1915.

MR. A. LAMB, O.B.E.,

Assistant Superintendent of the Line,
Great Northern Railway.

ON Wednesday evening, November 5, the Great Eastern Railway Musical Society gave its opening concert of the season. Special interest attached to the event inasmuch as it was the first ordinary concert given by the Society in the Hamilton Hall of the Great Eastern Railway Hotel since the war. The majority of its members who joined the colours have now returned, and it is hoped speedily to get back to the per-

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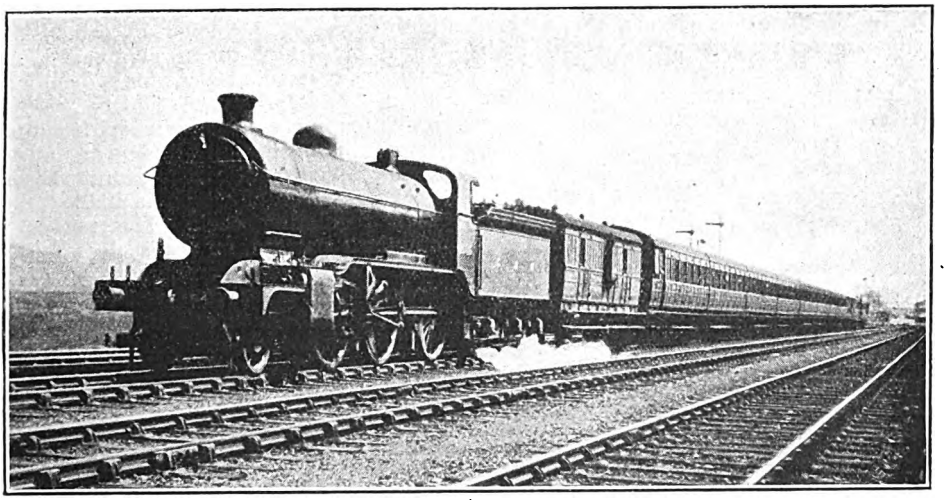

Photo.] GREAT NORTHERN RAILWAY. [*F. W. Curtis.*

Down Hitchin and Peterborough train. 2-6-0 locomotive, No. 1645.

formance of the masterpieces of musical art which it had been the custom to render in pre-war days. The Right Hon. Lord Claud Hamilton, the Society's President, occupied the chair, and was supported, amongst others, by Sir Henry W. Thornton, who spoke a few words of congratulation to the performers on the degree of merit which their music had revealed, and encouraged them to go on in their useful work, as he felt it was a good thing that the Great Eastern Railway should possess such an enterprising and successful Society. They felt much indebted to the members and to Colonel Galloway for providing them with such an excellent entertainment. Colonel Galloway, in response, thanked Lord Claud Hamilton, not only for the further evidence of his helpfulness in presiding that evening, but for the interest he had shown in the Society's welfare from its beginning. The remaining dates of concerts for the season are Wednesdays, December 3, February 4, March 3 and April 7.

* * *

PRESIDENT POINCARÉ, replying to the London County Council address, made an interesting reference to the Channel Tunnel scheme. The two countries, he said, were desirous that before long they would be able to choose indifferently between the methods of travelling between France and England, whether by an under-sea route, by steamer or by aeroplane. Let the distance separating the English and French coasts henceforth appear as short as the quays of the Seine and the banks of the Thames.

SIR E. GEDDES, replying in the House of Commons (for the President of the Board of Trade) to Captain Wedgwood Benn, said: The question of resuming through train services between Edinburgh and London by the West Coast route has been carefully considered, and in the general interest and in the interest of economy it has been decided that existing arrangements cannot be altered at present. The hon. member will understand that the present allocation of passenger traffic between London and Scotland is the natural one, namely, the traffic between Edinburgh and London passes via the East Coast, and that between Glasgow and London passes via the West Coast.

* * *

On October 30 the 9.37 p.m. Great Eastern Railway train from Doncaster to York—2.35 p.m. *ex*-Liverpool Street—drawn by rebuilt 4-4-0 No. 1020, was leaving the down platform line at Selby, North Eastern Railway, when it was run into by the 10 p.m. from Doncaster to York, a Great Northern train (North Eastern Railway "Z" class engine, No. 2199), travelling on the down through line. On November 3 the 7.20 p.m. Victoria—Portsmouth train, drawn by 0-4-2 tank engine No. 248, came into collision with No. 24, superheater 4-4-2 tank engine, travelling light.

* * *

NORTH BRITISH RAILWAY 0-6-0 engines, 25 in number, which were on service in France during the War, have been returned. They have been overhauled and are now back at

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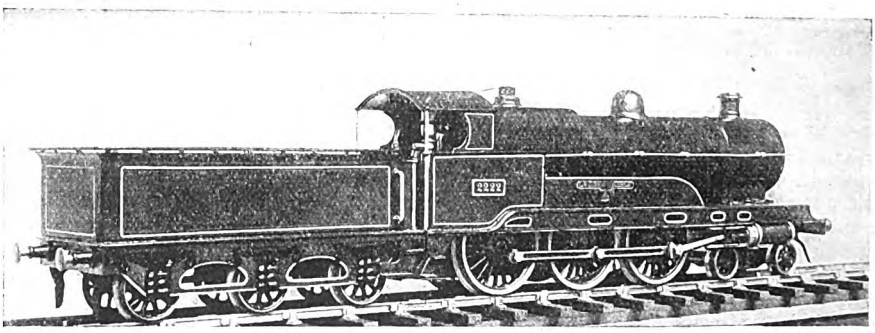
work in Scotland. Each engine has been given a name reminiscent of its overseas service. By the courtesy of Mr. W. P. Reid, the company's locomotive superintendent, the RAILWAY MAGAZINE is able to provide a complete list of the numbers and names, which are as follows :—

No. 650.—*Haig.*	No. 611.—*Allenby.*
No. 608.—*Foch.*	No. 673.—*Maude.*
No. 628.—*Byng.*	No. 660.—*Horne.*
No. 176.—*French.*	No. 647.—*Albert.*
No. 682.—*Joffre.*	No. 612.—*Ypres.*
No. 662.—*Birdwood.*	No. 666.—*Marne.*
No. 657.—*Plumer.*	No. 646.—*Somme.*
No. 659.—*Gough.*	No. 631.—*Aisne.*
No. 620.—*Rawlinson.*	No. 643.—*Arras.*
No. 627.—*Petain.*	No. 648.—*Mons.*
No. 621.—*Monro.*	No. 676.—*Reims.*
No. 661.—*Ole Bill.*	No. 605.—*St. Quentin.*
	No. 615.—*Verdun.*

and reversing by lever in cab. All exhaust pipes lead to the chimney. Fittings include covered safety valve, bell whistle, spring buffers, water gauge, try cock, regulator in cab, vaporizing spirit lamps and steam superheater. Cylinders are lubricated by special automatic lubricator in the smokebox (the door of which is made to open) with regulating cock. The tender is of standard pattern, on six scale wheels with steel frames, cast dummy springs and axle boxes. The model is enamelled throughout in semi-matt black and the lining and lettering is in accordance with standard London and North Western Railway practice.

* * *

IN regard to other models produced by Messrs. Bassett-Lowke, Limited, the firm write :—" We have much pleasure in stating that we are able to offer for the first time



MESSRS. BASSETT-LOWKES' SCALE MODEL OF L. & N.W.R. LOCOMOTIVE No. 2222, "SIR GILBERT CLAUGHTON."

BY the courtesy of Messrs. Bassett-Lowke Limited, THE RAILWAY MAGAZINE is able to illustrate one of the finest model locomotives this well-known Northampton firm of model engineers has to offer this season. It is a scale model of London and North Western Railway express locomotive No. 2222, *Sir Gilbert Claughton*. It is built for 1¾-in. gauge, length over all 24½ in. Net weight, 6¾ lb. and is priced £6 16s. Its frames are of planished steel plate with foot plating splashers, and buffer beams of similar material, all ornamental work being machine pressed. Wheels are scale model and in cast-iron, on steel axles running in brass bearings, with similar boxes for the coupled wheels. Boiler is of the plain cylindrical pattern, having large water capacity and made of brass throughout. It is tested to 45 lb. pressure. The engine is furnished with standard piston-valve cylinders with scale model connecting and coupling rods; eccentrics inside the wheels

clockwork or spring-driven locomotives made throughout in this country, having installed in our works special machinery for the production of these models, and are confident that the clockwork motor is equal if not better than those previously made in Germany. Our factory at Northampton which has now been engaged on model work of every description for over 10 years is well equipped with modern labour-saving machinery, and additional premises have recently been taken. In every department trade union rates of wages are paid. We have found the change over from war to peace conditions more difficult than we had anticipated, and regret we are not able to offer our clients at present a full range of our pre-war models. To enable the goods we sell to come within the reach of those of a more moderate purse and also to meet the demand of the model railway owner who prefers the low pressure piston valve cylinder locomotives to high pressure internally-

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fired engines, we have found it necessary to continue to deal in models which are partly or wholly made on the continent. In all cases where goods shown in our catalogue are made abroad we can guarantee that the conditions of labour are equal to those obtaining in factories in this country where similar work is done and we refuse to handle any goods, wherever they are produced, unless facilities are given to us to investigate the conditions under which the manufacture is carried on."

* * *

REFERRING to illustration on page 314 of our last number showing London, Brighton and South Coast Railway *Terrier* tank engine No. 647, Mr. O. J. Morris writes: "This engine was designed by Mr. William Stroudley and built at Brighton in December, 1876, receiving the name of *Cheapside*. In common with others of Stroudley's A Class engines, this one had cylinders 13 in. by 20 in., with centres 2 ft. 3 in. apart; wheel base 12 ft., wheels 4 ft. diameter, length over all 26 ft., capacity of water tanks 500 galls., and heating surface 518 sq. ft., weight 24 tons 7 cwt. Many of the class have been rebuilt with extended smokebox and separate sand box. Two of this class, Nos. 653 (*Ashtead*) and 661 (*Sutton*) work on the Crystal Palace-Coulsdon rail motor service.

* * *

IN the article on the Alexandra Docks and Railway which appeared in the September RAILWAY MAGAZINE, reference was made to three engines, Nos. 29 to 31, built by Messrs. Andrew Barclay and Co. The correct name of this firm is Andrew Barclay, Sons and Co., Limited, and their address is Caledonia Works, Kilmarnock.

* * *

IN the presence of a distinguished assemblage on Wednesday, November 12, at the Scotswood Works of Sir W. G. Armstrong Whitworth & Co., Limited, the steaming and trial of the first locomotive completed under the firm's reconstruction scheme provided the occasion for an epoch-making ceremony in the industrial history of Great Britain. Shortly after 2 p.m. the guests gathered round the locomotive—an engine of massive proportions and strength—and Sir Vincent L. Raven, K.B.E. the Chief Mechanical Engineer of the North Eastern Railway Company for which it has been built mounted to the footplate. Taking charge of the controls he admitted steam to the cylinders and gave life to the hitherto inanimate mass. The locomotive moved forward on its first official journey which, although a short one, was its introduction to a long life of tractive energy and speed in the railway world. At the conclusion of the brief and simple ceremony the guests were conducted round the new locomotive works and boiler shops to see for themselves the wonders worked therein during the past few months and hear the story of the strenuous changes which had been made from the mass production of shells to that of locomotives, the first of which had been viewed that day. The credit for this rapid reconstruction and the whole organisation of the new works must be given in full measure to the Manager, Mr. R. B. McColl. His energy, skill and experience are responsible for this magnificent achievement which has been completed in so short a space of time, and in the midst of many difficulties. The thorough manner in which the equipment of the works has been carried out and the carefully arranged sequence of the manufacturing operations, drew many appreciative comments from the guests, the greater part of whom were men whose lives have been spent in close association with the building of locomotives. In the evening the guests were entertained by the directors to a banquet at the Station Hotel, Newcastle-on-Tyne, to celebrate the occasion. The Chairman of Sir W. G. Armstrong Whitworth & Co., Limited, in the course of some interesting remarks stated that the new locomotive works were now the largest in the British Empire, and would shortly be the largest self-contained locomotive works in the world.

* * *

AMONG the recent activities of the Railway Club has been an enjoyable ramble over the route of the old Surrey Iron Railway. Under the guidance of the Rev. W. Cunningham Burley, who has made a special study of the railway's history, the outing was a great success. At the monthly general meeting of members at headquarters, 92, Victoria Street, S.W., on Tuesday, November 11, Mr. Evan Evans, Indoor Assistant Superintendent of the line, Underground Electric Railways, gave a very informing paper on Underground Electric Railway operation. His remarks were illustrated by lantern slides. Mr. W. Parker presided, and Rev. W. J. Scott led off the ensuing debate, in which many members joined. The annual club dinner will be held at the Holborn Restaurant, London, on Friday evening, December 19.

* * *

BY the courtesy of the London and South Western Railway THE RAILWAY MAGAZINE is able to illustrate the Memorial Arch under construction at Waterloo Station, London,

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quoted. It should be remembered, however, that Italy has to import every ounce of her coal supply and that we have not this difficulty in this country. He also made the statement that a slow train was more expensive to run than an express, owing to the cost of starting and stopping, but in many cases a slow train is of lighter weight than the modern fast train. He also made no mention of rail-motor working. He advocated the organisation of motor buses and lorries to deal with all traffic for distances of less than 50 miles, and would confine the railways entirely to long-distance traffic, and eliminate all small stations. This seems rather drastic, but it was interesting to listen to as criticism, and the discussion that followed was quite helpful.

* * *

FOR some time there has been under consideration and provisionally sanctioned a scheme for the electrification of the North Eastern Railway main line between York and Newcastle (a distance of 80 miles). The scheme provides also for the electrification of the loop line (31 miles in length) from Northallerton to Ferryhill via Stockton. On these portions of the railway there is a very heavy and varied traffic. Hitherto the experience of the company with electric traction has been confined to the working of a dense local passenger traffic on Tyneside between Newcastle, North Shields, Tynemouth and Whitley Bay, and of the mineral traffic between Shildon and Newport (Middlesbrough). The former was opened in 1904, and the latter in 1915. As regards passenger electric train service the Lancashire and Yorkshire Railway was likewise to the fore with the electrification of the line between Liverpool and Southport, which was also opened in 1904, and since then there have been considerable developments in the London area. No other railway in Great Britain has, however, experimented with the electric haulage of freight trains. On Tyneside the third rail system is in use, but between Shildon and Newport overhead electrical equipment has been adopted, and the mineral trains are hauled by powerful electric locomotives. The new proposal is a combination of the third rail and overhead systems, and the general idea is that the former should be used on the running lines, and the latter adopted in the goods yards and at large stations. The type of third rail selected would be fully protected and be in every way suitable for high-speed running. All trains would be hauled by locomotives. The type of passenger locomotive has not been finally decided upon, but the freight engines are to be similar to those in use between Shildon and Newport. All locomotives will be fitted with shoes and bows for collecting the current, which will be of the same voltage as on the Shildon-Newport line.

* * *

NEARLY a quarter of a million people use Charing Cross Underground Railway Station daily. The number of passengers entering and alighting is made up of 190,000 ordinary and workmen ticket holders and 32,000 season ticket holders. The Metropolitan District, Bakerloo and Hampstead Railways serve this station and a total of no less than 2,920 trains pass through daily. The new stairways now under construction will relieve to a large extent the congestion during the rush hours of the world's busiest station.

* * *

WITH the adoption of the eight-hour day on the bus services, tramways and railways operated by the London Underground, an additional expenditure is incurred of nearly £700,000 per annum and approximately 20 per cent. more staff are required to work the service.

* * *

IN spite of the arduous nature of their work, the number of involuntary stops made by motor buses on the London streets during the last 12 months works out at the extremely low figure of one stop for every 10,000 miles run. The broken-down London bus is like the proverbial dead donkey—very rarely seen—and these statistics are a tribute to the efficiency of the present day internal combustion engine.

* * *

IT is not generally recognised the amount of relief which the automatic ticket machines afford to the booking offices at rush hours. The number of machines in use on the London Underground Railways is over 130, and during the last 12 months no less than 42,000,000 tickets were issued from them.

* * *

ON December 6 the East London Railway celebrates its jubilee, the first portion of the line (from New Cross to Wapping) having been publicly opened on December 6, 1869. At that time, and for some years later, the London, Brighton and South Coast Railway was the working company. A descriptive account of the East London Railway appeared in the April, 1919, RAILWAY MAGAZINE.

* * *

THE Head European Office, Dominion Express Company, has just issued a revised and comprehensive tariff giving full details of the company's activities, Customs regulations for the forwarding of goods and a list

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of through rates in sterling, dollars and cents, on merchandise by direct steamer from Liverpool, Bristol, Glasgow, Belfast, Antwerp and Havre to points of the Dominion Express Company in Canada. Showing the comprehensive service maintained by the Dominion Express Company it may be mentioned that rates on packages weighing from 1 lb. to 100 lb. and measuring from 6 in. to 5 ft. are given to upwards of 3,750 points of the Dominion. Other matters dealt with in the handbook comprise Dominion Express money orders, unlimited cheques, cable transfers, travellers' cheques, and a list of the company's chief European offices and agencies.

* * *

THE findings of the Queensland Public Works Commission on the proposal to construct a railway from Dunwinnie on the border railroad to St. George, distance 43 miles 67 chains, have been issued. The majority report states that after carefully weighing all the matter placed before them they were of the opinion that the building of the line is not warranted at the present time, principally because of the small area of crown land immediately available for settlement. It was estimated that the construction of the line would cost about £200,000, and the evidence also showed that the line, if built, would not altogether escape flood waters. The minority report favours the construction of the line for a number of reasons. It points to the general productivity of the district, and the fillip that line would give to that production and to settlement in the district. It holds that it is worthy of a railway, as 3,216,100 acres of good pastoral land would be benefited by it. The minority also said that the proposed line was unanimously desired by the people of St. George, and further, that it would form the first section of a through connection to link up with the main western line at Roma, or up the Maranoa River to Mitchell.

* * *

ACCORDING to a correspondent, the first completed section of the Madrid underground railway was opened in October. This section of the Madrid tube railway, the first of its kind in Spain, covers a distance of 2½ miles, running north to south, from Cuatro Caminos to the Puerta del Sol, the central part of the metropolis. This first track has taken two and a half years to construct, and the opening took place on the exact day forecasted by the engineers at the time the concession was granted by the Government. The material and rolling-stock are of the most up-to-date manufacture, and, with the exception of a few small items, everything used in the work of construction was produced in Spain. The cost of the first section has been about £320,000. There is a double electric track, capable of running a three-minute service both ways, each train conveying up to 500 persons.

* * *

OWING to the many difficulties in the way of securing an adequate supply of coal for the locomotives of the Central Argentine Railway wood has largely been used in its stead, but as 3 tons of wood are requred to provide the equivalent calorific value of 1 ton of coal, and there are certain operating difficulties, the use of wood has not been found very satisfactory. Therefore, when oil supplies became easier, arrangements were made for the use of oil as a locomotive fuel. In the early part of next year it is expected that about one-quarter of the system will be running on oil fuel, and it is anticipated that a material saving in running expenses will thus be effected. The directors announce that "it is intended by degrees to extend the use of oil fuel to other parts of the line wherever this proves economically feasible."

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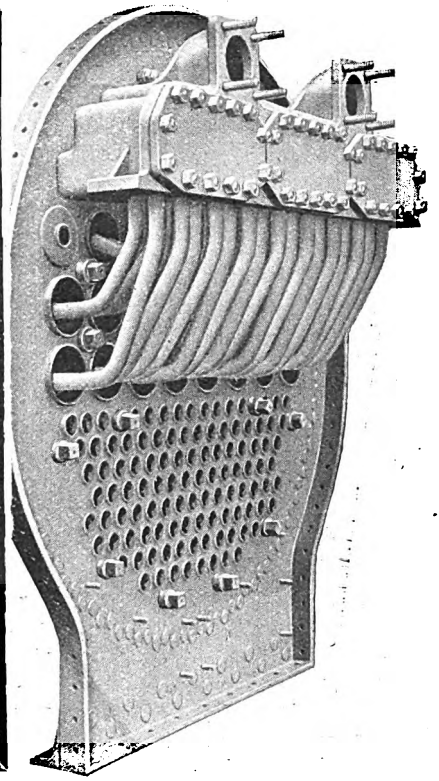

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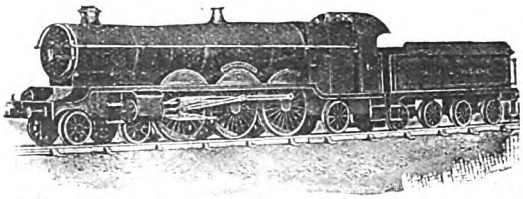

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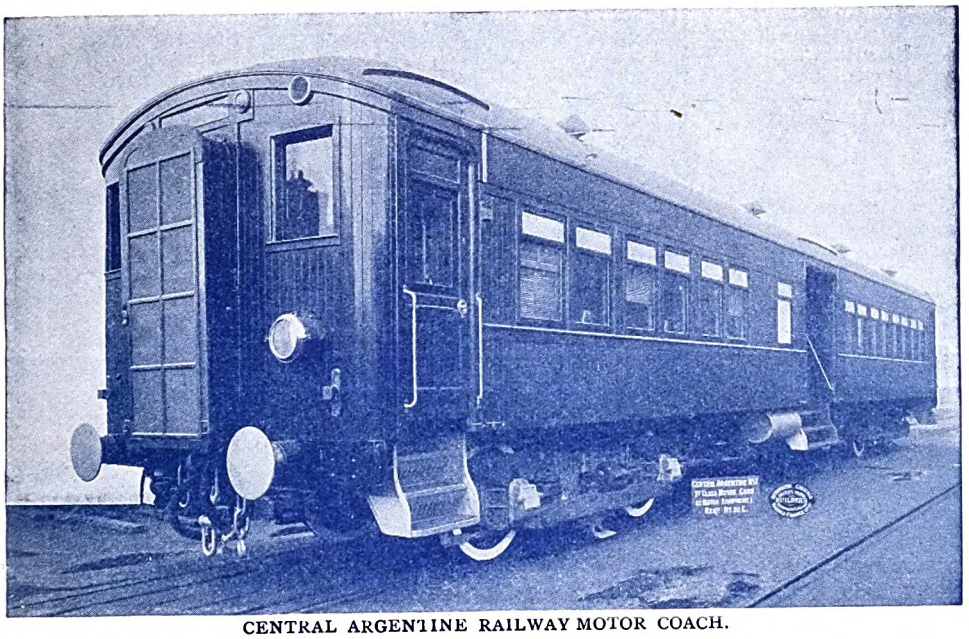

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